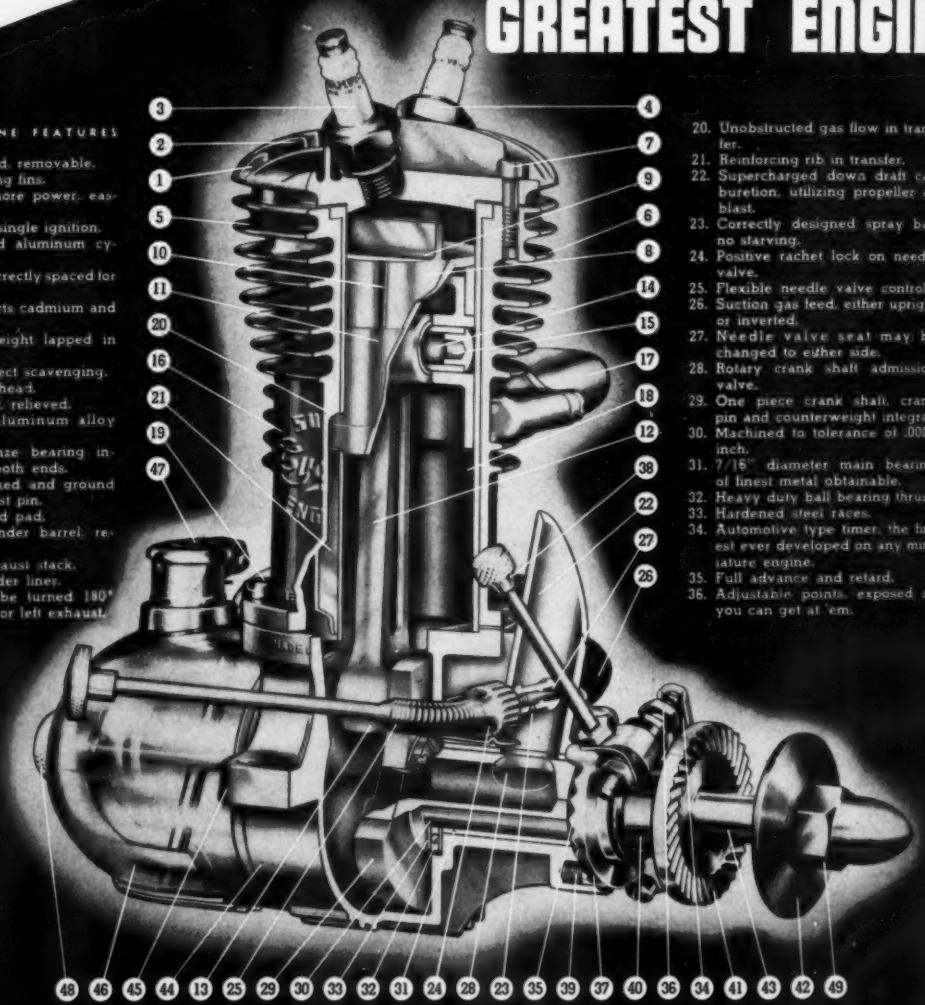
MODEL AIRPLANE NEWS

13th Year of Publication

JULY 1941
20c

Curtiss XSB2C-1
Dive-Bomber

HERE'S WHY SUPER-CYCLONE IS THE WORLD'S GREATEST ENGINE



SUPER-CYCLONE FEATURES

1. Aluminum head, removable.
2. Fourteen cooling fins.
3. Twin spark—more power, easier starting.
4. Either dual or single ignition.
5. Highly detailed aluminum cylinder.
6. Twelve fins, correctly spaced for proper cooling.
7. Screws and parts cadmium and nickel plated.
8. Super light weight lapped in piston.
9. Radius for perfect scavenging.
10. File-hard steel head.
11. Aluminum skirt, relieved.
12. H sectioned aluminum alloy con rod.
13. Oversized bronze bearing inserts, bushed both ends.
14. Tubular hardened and ground full floating wrist pin.
15. Non-scoring end pad.
16. Aluminum cylinder barrel, removable.
17. Removable exhaust stack.
18. Cast iron cylinder liner.
19. Cylinder may be turned 180° for either right or left exhaust.
20. Unobstructed gas flow in transfer.
21. Reinforcing rib in transfer.
22. Supercharged down draft carburetion, utilizing propeller air blast.
23. Correctly designed spray bar, no starving.
24. Positive rachet lock on needle valve.
25. Flexible needle valve control.
26. Suction gas feed, either upright or inverted.
27. Needle valve seat may be changed to either side.
28. Rotary crank shaft admission valve.
29. One piece crank shaft, crank pin and counterweight integral.
30. Machined to tolerance of .0001 inch.
31. 7/16" diameter main bearing of finest metal obtainable.
32. Heavy duty ball bearing thrust.
33. Hardened steel races.
34. Automotive type timer, the finest ever developed on any miniature engine.
35. Full advance and retard.
36. Adjustable points, exposed so you can get at 'em.
37. Timer assembly 180° reversible.
38. Easily accessible spark lever.
39. Plunger lock on ignition timer.
40. Hardened steel cam.
41. Non-slip prop drive.
42. Hardened prop washer.
43. Fine steel prevents bending in slightly abnormal landing.
44. Aluminum crank case with fins for air cooling and appearance.
45. Crash proof engine lugs.
46. Transparent fuel tank.
47. Large approved snap cover
48. Tank can't shake loose.
49. Hardened bullet nut.

AND A FEW THINGS TO REMEMBER

50. Most thoroughly designed and finest appearing engine on the market.
51. Finest aluminum die castings the world affords.
52. No leaky clamp-on or screwed-on port covers.
53. Aircraft steel engine mounts standard equipment.
54. 4 conversions to choose from.
55. Upright models may be changed to inverted and vice versa without additional parts.
56. Comes all mounted and ready to install, coil and condenser included.
57. Manufactured by an old established aircraft concern.
58. SUPER-CYCLONE will fly any kit now on the market—WITH POWER TO SPARE, yet light enough for small jobs.

CYCLONE

"G" SERIES AIRPLANE ENGINE UPRIGHT DUAL IGNITION **$15**

...and HERE'S the PROOF!

FIRST AND SECOND IN BAKERSFIELD MEET
FIRST AND SECOND IN POMONA MEET
FIRST, SECOND AND THIRD IN SAN DIEGO MEET
WORLD'S HIGH SPEED RACE CAR RECORD, 87.37 MPH
WORLD'S ¼ MILE RACE CAR RECORD, 87.37 MPH
WORLD'S ½ MILE RACE CAR RECORD, 86.49 MPH
WORLD'S ONE MILE RACE CAR RECORD, 86.70 MPH

Even this unequalled list of individual features would not constitute leadership unless they were properly engineered to work together in producing unsurpasssd performance. Consistent performance is the ultimate proof of design, material and craftsmanship ... and that's why SUPER-CYCLONE owners have dominated the three largest airplane meets yet held in 1941 and hold every world's race car record! First place in a meet is often determined by a fortunate thermal, but when 'CYCLONE takes first and second in the huge and important Bakersfield, Calif., meet; first and second in the Pomona, Calif. meet and first, second and third in the San Diego meet (placing 10 out of the first 22, as well) IT MUST BE THE ENGINE!

Race car performance is the greatest test of engine stamina and construction, and SUPER-CYCLONE dominates the field by establishing the following records: World's High Speed and 1/4 mile record—87.37 M.P.H., World's 1/2 mile record—86.49 M.P.H., World's one mile record—86.70 M.P.H. At these terrific speeds and high RPM the failure of one tiny part may bring instant disaster. No one knows engines more thoroughly than the builders of the world's fastest race cars, and with large investments at stake, their unhesitating selection of SUPER-CYCLONE as the ideal power plant is your assurance that this is the finest engine obtainable AT ANY PRICE!

★

Plan to attend the National Championships in Chicago and plan to get up where the thermals are by re-powering that contest ship with Super-Cyclone ... the world's greatest engine!

50% DISCOUNT FOR YOU!

In buying SUPER-CYCLONE direct from the manufacturer, you save 50% (the usual distributor's commission) and obtain the world's most complete engine for 1/2 price! Thus you get a $26.00 engine for only $13.00 or a $32.00 engine for $16.00.

ORDER BLANK

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HOME OF THE FAMOUS CURTISS-WRIGHT TECHNICAL INSTITUTE

Please send me the items checked.
I enclose POST OFFICE MONEY ORDER

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- ☐ Upright Single Ignition . . $13.00
- ☐ Upright Dual Ignition . . $15.00
- ☐ Inverted Single Ignition . . $13.50
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PROPELLERS — Finest Quality Obtainable (☐ 14", ☐ 15", ☐ 18") . . 50c
☐ Steel Mounting Brackets . . . 50c

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- ☐ Single Ignition $14.00
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SHIP TO _____ AGE ____

ADDRESS _____

MA-7

ON THE BEAM

WITH A KITCHEN table . . . for a work bench; a burning ambition . . . for power; and an idea whetted by the stones of adversity . . . for tools—a model builder recently produced the almost perfect wing section.

THE IDEA BEHIND this accomplishment was propagated from the accepted premise that a propeller blade is nothing more than a wing, producing force by revolving action, and that the wing itself is dragged as a passive instrument without creating any active force of its own.

BUT IF A PROPELLER blade is a wing and creates force in motion, then a wing in motion creates force—that was the logic back of the idea. Perhaps a speeding wing was lacking in the generative force due to design or to the retarding action of controls.

WIND TUNNEL TESTS, with smoke to make the air visible, seemed to justify this conclusion, for when any wing was jerked out sideways, revolving whorls of air were evident around the evacuated area. It was reasonable, then, to assume that a wing has a revolving tendency that transmits force to the air—an action that causes the wing to revolve on its lateral axis like a lawn roller. For the air to be smooth, this revolving action would require an even center of pressure or axis, so the perimeter or rim described by the rotating wing would have to be round. The obvious deduction was that the mechanical principle of the wheel might be applied to airfoil design—the leading edge to be circular instead of parabolic.

THIS THEORY WAS justified by tunnel tests on a model airfoil section, and later proved practical when in May 1939 a 52 passenger Consolidated Flying Boat took off from San Diego harbor. This mighty machine was equipped with a wing incorporating this revolutionary principle. Making a phenomenally short run, the heavy hull, 23 feet deep, lifted off the water like a land plane. After a few minutes in the air, the test pilot deftly whipped his huge craft about the sky and in a final burst of boyish enthusiasm, dive-bomber fashion, swooped on the factory and zoomed away in a steep climbing turn. Later, on landing, the pilot made an amazing and most unprofessional report: "It's a pursuit plane!" he cried.

AND HIS ENTHUSIAM has been vindicated. By this radical design, bomber loadings have been increased 20%—speed increased 100 miles per hour—and landing speed reduced to 60 miles per hour.

MODELS HAVE AGAIN proved to be the key that unlocks the secrets of flight from the storehouse of Science.

The Editor

13TH YEAR OF PUBLICATION

MODEL AIRPLANE NEWS

JULY, 1941 VOL. XXV, No. 1

CONTENTS

Edited by
Charles Hampson Grant

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It's a great sport! Whether you read, build or fly—or all three—model aviation is fascinating fun. Know the thrill of a perfect takeoff—hear the howl of the motor as the prop pulls her skyward—watch a graceful, glide landing.

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FLYING WITH AN OLD-FASHIONED PROP!

SEVERAL THOUSAND HOURS RESEARCH BY MODELCRAFT ENGINEERS NOW BRINGS AN ENTIRELY NEW, BETTER - BALANCED FASTER - CLIMBING PROP—THE MOST IMPORTANT ADVANCE, WE BELIEVE, IN PROPELLER ENGINEERING!!

SCIENTIFICALLY DESIGNED

from the "Propeller Handbook" by Karl Hannson Falk, Chief Blade Designer, Hamilton Standard Propeller Co. All modern aircraft use a variable pitch propeller, starting in LOW PITCH for rapid take off and climb. *High pitch* is used only at high altitudes on level flight, a condition which the model aeroplane propeller does not have to consider. Hence, D-G props are LOW PITCHED for maximum speed of climb, and achieve a minimum torque turn through exact balanced relation of hub and effective blade area. Don't handicap your motor. Switch to D-G's now and SEE the improvement.

NOT A CLUB IN A CARLOAD TO BREAK YOUR CRANKSHAFT

25c

8" to 14". Every prop hand-sanded

D. G. PROPELLER CHART

Several thousand hours of research have developed the following general facts about propellers:

The ideal propeller seems to be one of the largest diameter the engine will swing and still develop its maximum power. Thus as the pitch was lowered the length was increased. The combination of pitch and length which delivered the most thrust was, of course, the one we chose for our D. G. propellers. The lowered pitch showed less tip loss and a cleaner air flow, plus a greater amount of effective blade area, checked by smoke tests.

Care in cleaning up the hubs added some thrust, but more important, it eliminated what had been drag.

Washing out the pitch at the tip also has much to do with the thrust and tip loss. The thrust loss can be measured in ounces when the under side of the tip is flat, or completely washed out. While the amount of pitch at the tip of the prop has much to do with the amount of torque, the lowered pitch decreases the "torque turn" so much the final results are a propeller with less "turn" than usual.

It was discovered the shape of the blade had little to do with final results. The position of the maximum blade area was important, i.e., it should be as close to the hub as possible consistent with a well developed hub.

Engine	Prop Size New Engine	Prop Size Old Engine
Atom	9"	8"
Bantam	10"	9"
Brat	9"	8"
Brown B, C, M, D	14"	14"
Brownie E	11"	11"
Baby Cyclone	13"	12"
Super Cyclone	14"	14"
Barker	14"	13"
Bunch Engine	13"	12"
Comet	13"	12"
Dennymite	14"	13"
Little Dynamite	14"	13"
Elf	11"	11"
Forester 29	11"	11"
Gynn	13"	12"
Husky JV	11"	10"
Hurleman	13"	12"
Hi Speed	11"	11"
Midget	12"	12"
Madewell	9"	9"
Megow	10"	9"
Ohlsson 19	10"	9"
Ohlsson 23	11"	10"
Ohlsson 60	14"	14"
Ohlsson Gold Seal	13"	13"
O.K. Standard & Special	14"	14"
O.K. 49	12"	12"
Phantom	11"	11"
Perkey	10"	10"
Syncro B 30 & PC2	10"	10"
Torpedo	11"	11"
Tiger	13"	12"
Tom Thumb	12"	12"

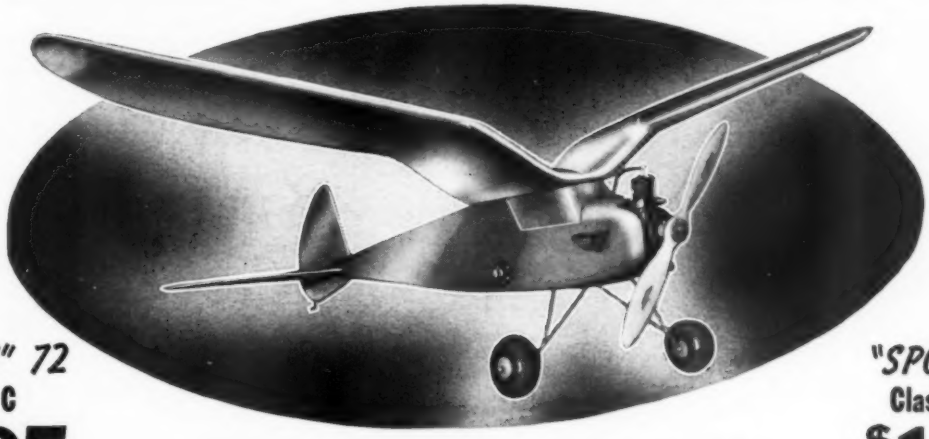
FOLLOW THIS CHART FOR FASTER CLIMB

FLASH! Jim Walker, builder of the "Fireball," reports increasing his speed from 62 to 67 m.p.h. through switching to the correctly specified D-G prop for his Class B motor.

"Largest Supply House in the West"

7306 South Vermont Avenue, Los Angeles, Calif.

SPEAKING OF QUALITY MODELS



"SPOOK" 72
Class C

$3.95

Wondering about Class C? Here is your opportunity—with a well-made ship that comes down all in one piece.

THE STANDARD OF AIRABILITY

You'll Really Go To Town With This High Pefromance Gas Model That Preceded the Navy's Latest Martin Patrol Bomber by Six Months. Every Part Beautifully Made and Matched. A Modelcraft *Value.*

"SPOOK" 48
Class A or B

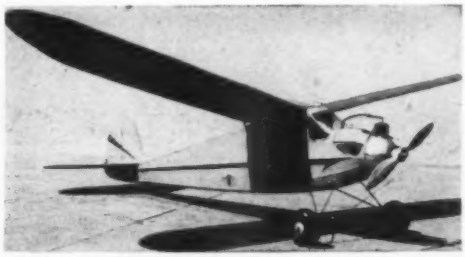
$1.50

Whatever else you're flying, build a Little Spook before the summer is over. Takes half the time of ordinary models.

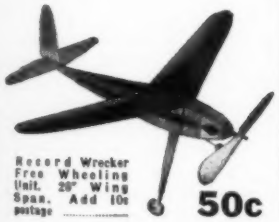
MISS TINY—**Class A $2.95**

TWO WINNING
AVIATOR'S MODELS

Write for specifications and details



SKY BABY—**Class B $3.85**



Record Wrecker Free Wheeling Unit. 29" Wing Span. Add 10c postage

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Everything Modern

A de luxe rubber job with the features that it takes to win important contests: Polyhedral Wing, Dihedral Stabilizers, One Bladed Folding Prop, 45 ft. very best rubber, and everything necessary to build a truly fine flyer. Has beaten former National Champions. Requires *minimum* adjustment.

$1.50 Complete

WAR MODELS

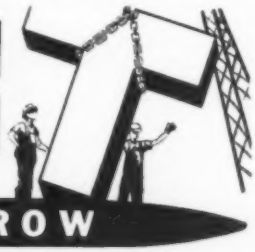
Stuka JU 87B— Spitfire
Messerschmitt Airabonita
Curtiss P-40

25c each Solid or Flying

Add 10c postage. On set of 5, add just 20c postage. You save 30c.

CRAFT

PLANES AND FLYERS OF TOMORROW



"You can get it from Modelcraft"

WRITE FOR MODELCRAFT'S 1941 CATALOG—MAILED FREE

This Hawk 75 dived at 575 m.p.h. during test flights

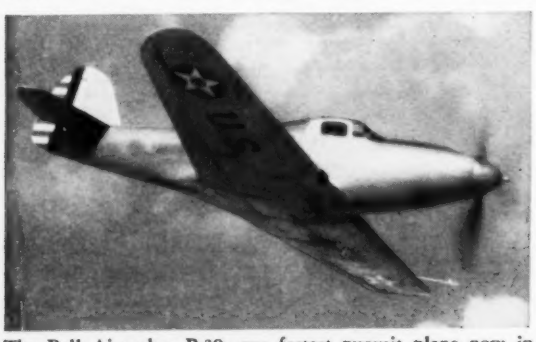
AMERICAN OVER

By LARRY McROBERTS

GREAT BRITAIN has purchased in large numbers EVERY military airplane capable of combatting the German Luftwaffe there is available in the United States. But, she has not purchased them "as is," not by a long shot! England has learned, after more than a year and a half of the most brutal, savage and unrelenting aerial warfare in the history of mankind, many terrible lessons which she has passed on freely to the American designer. These lessons she has said may be used on American airplanes or not, just as the Army Air Corps or Naval Aviation chooses. But she has said they MUST be used on ALL airplanes being built for service with the Royal Air Force.

What are these "musts" that are on the list of contract specifications of every British Air Ministry order in these United States? Here are some of them:

ARMAMENT—More, more and more guns is the major demand of the British. When the machine gun was first used on an airplane early in 1915 followed by the introduction of Anthony H. G. Fokker's synchronized design in April of that year, it was regarded as a "terrible weapon" and the airplane a "thing of destruction." But there is a difference between destroying a gnat and killing a man-eating tiger and when the far-famed Hawker "Hurricane" was introduced late in 1935 with EIGHT machine guns the airplane had become truly a "tiger-killer." And when hunting the aerial tigers of the Luftwaffe, the fighters of the Royal Air Force MUST be adequately armed for the hunt.

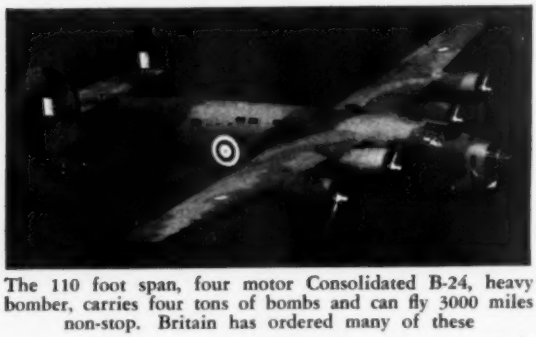


The Bell Airacobra P-39, our fastest pursuit plane now in England. It has 4 machine guns in wings and two in the nose, also a 37 mm. cannon firing through propeller hub

To-day, no American fighting plane is going to England with less than six machine guns (two synchronized in the nose, two in each outer wing panel) at least two of which (nose guns) must be fifty caliber weapons.

Even the bombers, light and heavy, must be more efficiently armed than found to date in our Air Force. The nose gunner must have at least one .50 caliber machine gun, the rear gunners (two of them) must also have adequate .50 caliber ammunition to supply them for a full hour of action (1,000 rounds). The ammunition question can be more easily understood when it is explained that present practice forbids the firing of a machine gun for more than 8 seconds at a burst, to prevent the barrel and mechanism from overheating. This 8 second burst will deliver 120 rounds of steel-jacketed .50 caliber slugs, enough to do considerable if not fatal damage to an enemy airplane. In general, an attempt is made to cool the guns three minutes between firing, but actual wartime conditions sometimes will not permit this. Under such circumstances, the gunner runs the risk of causing a "runaway" gun, in which the heat of the gun will fire the cartridges automatically without the use of the impulse to the trigger motor. The gun thus continues to fire until the ammunition case is exhausted and invariably results in a totally damaged gun, beyond repair with the exception of certain salvagable parts.

Aerial cannon must be used whenever and wherever possible. The term "cannon" has come to mean anything greater than the .50 caliber machine gun. Most widely tested is the 27 mm., the 37 mm., and an experimental 75 mm. cannon now being experimented with at Wright Field



The 110 foot span, four motor Consolidated B-24, heavy bomber, carries four tons of bombs and can fly 3000 miles non-stop. Britain has ordered many of these

33 Lockheed Hudson bombers here await shipment to England; only part of many ordered. (Acme)

The first Brewster pursuit and dive bomber for Britain, after final test flights. (Acme)

First of 28 Consolidated patrol bombers on its way to England after a flight across the continent. Note the machine gun bulges to rear of wing. (Acme)

WINGS BRITAIN

Douglas DB-7 (Havoc). Many recently bombed Germany (Acme)

American Planes Now Serving With the British and Details of Their Equipment Required for Combat

for installation of the giant Douglas XB-19. The cannon has a rate of fire of only 50 rounds per minute, and since the shells come in clips of five, they must be re-loaded by hand cutting down the rate of fire to perhaps ten a minute. However, rate-of-fire is not paramount with the cannon. Its deadly accuracy and long-range characteristics are its outstanding advantages. At least three American single-seat fighters (Bell Aircobra, Curtiss P-40 and North American NA-73) carry these cannons mounted in the nose firing through the propeller hub.

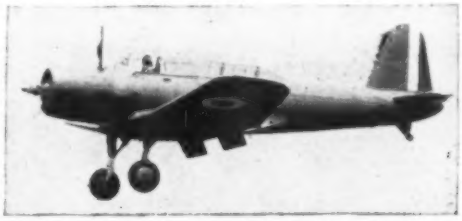
The free-firing swivel-mounted cannon presents certain problems which have not been successfully overcome in either this country or abroad. But the mount worked out by the Douglas designers on the B-19 seems the most feasible answer to the question, although Wright Field tests must still determine its serviceability.

ARMOR PLATE—The combat plane must have a defense in addition to its offensive terror. And this defense has taken the form of armor plate bolted into the structure at advantageous points. The armor plate for American warplanes is being made by the American Car and Foundry Company of X-7440 steel, a new alloy especially developed for the purpose. This high-grade steel is heat-treated by placing the plates in pairs in boxes. Five boxes at a time are placed in the furnace and left at a temperature of 1600° F. for ONE MONTH! After this they are rolled, the work-hardening making them even tougher. They are then cooled for a week and cut to shape. They are re-heated after this, then given a final casehardening, which makes them seventeen shades tougher than tough!

The armor plate used on the single-seat fighter (Curtiss, Brewster, Grumman Bell, Vultee and North American) is very thin and weighs about 25 lbs. for the small plate forward of the cockpit and about 100 lbs. for the large plate placed aft of the cockpit. The Grumman fighter has additional plates placed around the power plant compartment as well as under the floor with a consequent decrease in performance due to the added weight.

The medium bombers of the Martin B-26, North American B-25 and Douglas A-20A type carry a 50 lb. plate forward of the pilot, and two large 175 lb. plates forward and aft of the rear gunner. The nose gunner and bombing officer-navigator is thus left unprotected but it is not supposed that many planes will ever get in FRONT of these fast (350 mph) medium

(Continued on page 42)

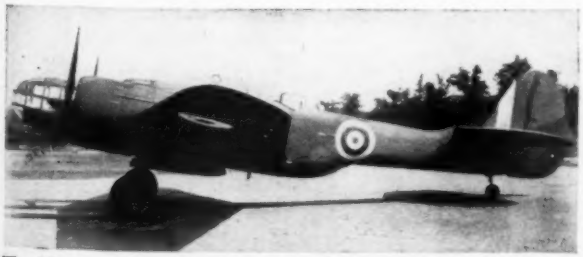


Forty of these Vought carrier planes have seen service in France and England

Advanced training plane "Harvard" used extensively by British. (B.O.P.)

The Curtiss P-40, 390 m.p.h. pursuit plane; many now fly to protect England. (Acme)

The latest model Boeing flying fortress is participating in raids on German cities. (Globe)



The Martin attack bomber, Maryland, powerfully armed. (Acme)

A Grumman fighter, Martlet I, now with British fleet (Acme)

Academy of Model Aeronautics

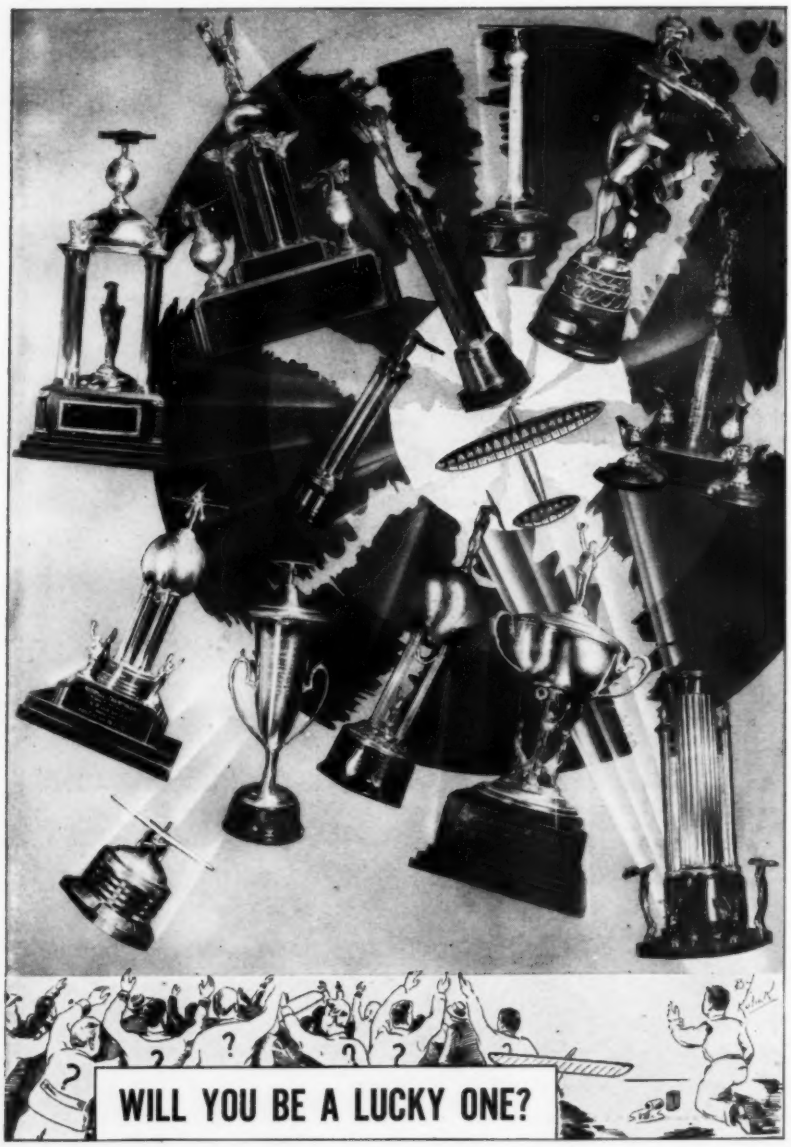
A Division of the National Aeronautic Association

OFFICIAL MODEL AIRPLANE NEWS

DON'T forget, there is less than one month's time between now and the Nationals; to be held in Chicago July 1 to 5. Last year there were 1400 contestants; every year the contest grows so you can make your own guess as to how many will be on hand at this coming "brawl."

It will be a big affair—sponsored by the Chicago Park District and *"Chicago Times"* under the sanction of the Academy of Model Aeronautics. Official headquarters will be the Hotel Sherman. Further information may be obtained by writing the Academy of Model Aeronautics, Washington, D. C., or Mr. Maurice Roddy, Aviation Editor *"Chicago Times,"* Chicago, Illinois. Additional data was given in the April issue of MODEL AIRPLANE NEWS—This is just a reminder so that there will not be too much hustle and bustle at the last minute to finish all the many details on the ships you wish to enter—and here's another hint—don't forget to set that timer on trial flights made within the next few weeks, otherwise you may not have a ship to take to Chicago!

WHO WILL WIN AT THE NATIONALS?



Model Plan Builders Are Good Defense Workers

The skill developed by model airplane hobbyists is proving of practical service to national defense, it is reported by the Academy of Model Aeronautics, a Division of the National Aeronautic Association.

More than 200 of these young men are working at the Langley Field laboratories of the National Advisory Committee for Aeronautics. Entered under Civil Service examinations, they are classified as Under Model Aircraft Makers but are performing a wide variety of duties, they not only build but test the scale models at Langley.

One group is building a propeller for the new high-speed wind tunnel. In picking new men, NACA has found them superior to skilled craftsmen because they know the theory of flight and practical details of plane construction.

Charles A. Hulcher, the first model builder to be employed by NACA, now is supervising the work of 50 young men from 18 to 20 years of age. The plan was worked out by Edward R. Sharp, Construction Administrator of NACA.

Academy Spring Clean-up

While A.M.A. flyers have been "cleaning-up" at meets, A.M.A. headquarters has been cleaning out its files.

Presented below is a collection of names and addresses of those chaps who were issued A.M.A. Gas or Rubber Licenses but for some unexplainable reason no one will admit knowing such and such model builder at the address deciphered from the application blank (you should see some of the ink spots we have to interpret!).

In other words these are credentials which have been returned to us by the Post Office.

Some date as far back as last July!

So don a thinking cap while A.M.A. officials don a dust cap! Write our licensing division if you know the whereabouts of any of these flyers.

Please remind flyers, at all times, to PRINT their names and addresses on their applications and remit license fees via P. O. MONEY ORDER—and our licensing division will be in a position to give AAA super service.

A.M.A. credentials returned by the Post Office are:

Robert W. Achterberg, 718 Church St., St. Joseph, Mo.

James Burger, 4806 Dakota Ave., Nashville, Tenn.

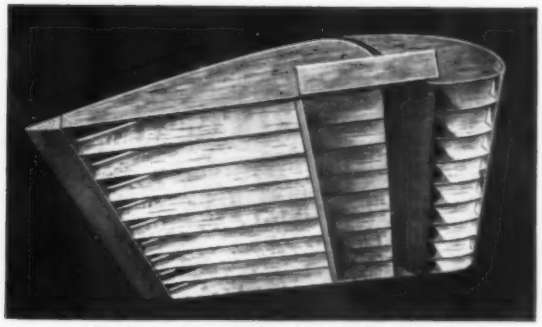
John Calvert, 3103 S. Jefferson Blvd., Springfield, Mass.

John Dyar, 3103 Belmer Blvd., Cleveland, Ohio.

Bill Elliott, 458 Dravo Ave., Beaucy,

(Continued on page 64)

This shows the narrow slot opening on the wing's upper surface



On the under side the slot opening is wide

A Slotted Wing for Models That Prevents Stalls, Increases Climb and Makes Careful Adjustment Unnecessary

Slots FOR MODELS

By FRANK EHLING

AS LONG as model airplanes are designed there always will be the problem of stability to contend with. Then, too, the drag of a model plane is one of the most serious difficulties which must be considered, as far as climb and soaring flights are concerned.

The average model builder usually assures himself of a stable ship by the use of a long tail moment arm. Such a ship will fly at the will of the builder, but its performance in general will be rather sluggish; the large amount of drag set up is bound to make the climb and glide poor. In addition, the chance of recovery from a dive is less certain, as it takes longer for the long moment arm to recover and the possibility of catching a thermal is lessened.

While the use of slots on model ships is not an innovation, there are few who will trust their knowledge of them to an open, specific discussion of merits and shortcomings.

We recently had occasion to experiment with them and this is our story: As there was no wind tunnel available, we conducted our tests with the slotted wings on a ship of proved design and thereby made certain that our trials would correctly prove the effect slots have on model airplanes.

The first tests were attempted with the straight letter-box type (fig. 1) plane. Here the air was shot straight up through the wing and the effect was noticeable only when the slot was one-third of the way along the wing cord. However, this was so slight that we certainly could not stop there and call our experiment a success. What we saw though was really encouraging, because we knew that we were working along the right lines.

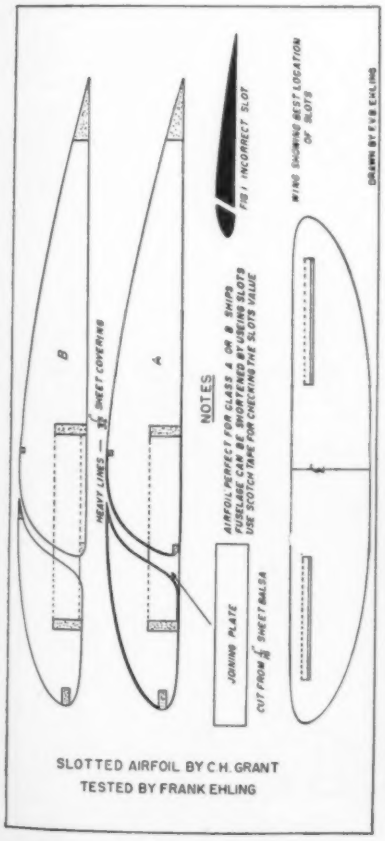
Mr. Charles Grant, editor of MODEL AIRPLANE NEWS, then designed the rib with the slot shown in the diagram; making use of the curved slot. This slot was constructed with a smaller opening on top than on bottom, for the purpose of compressing the air onto the part of the wing that it would normally leave. It was here that we really began to see the fruit of our efforts: The compressed air on this point of the wing was what we needed for increasing the lift.

When the wing was attached the model was balanced and seemed a trifle tail heavy. However, the wing could not be shifted or the weight changed so we took a chance and glided the plane. Much to our surprise, it had a nearly-perfect glide, proving the stabilizing effect of the slots.

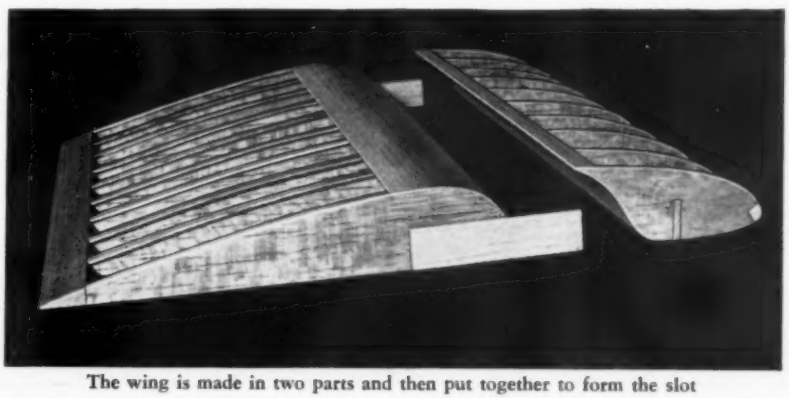
The model was then ready for its first power flight. Using the same amount of caution which we would exercise in any other job, we launched the ship with the motor just turning over. It flew along with its nose well up in the air as though it had something to be "snooty" about; and it certainly had. On the second trial we opened the motor up a little more and the flight was indeed something to behold.

At this point things were running so smoothly that we began to wonder whether it was just that we were using so good a

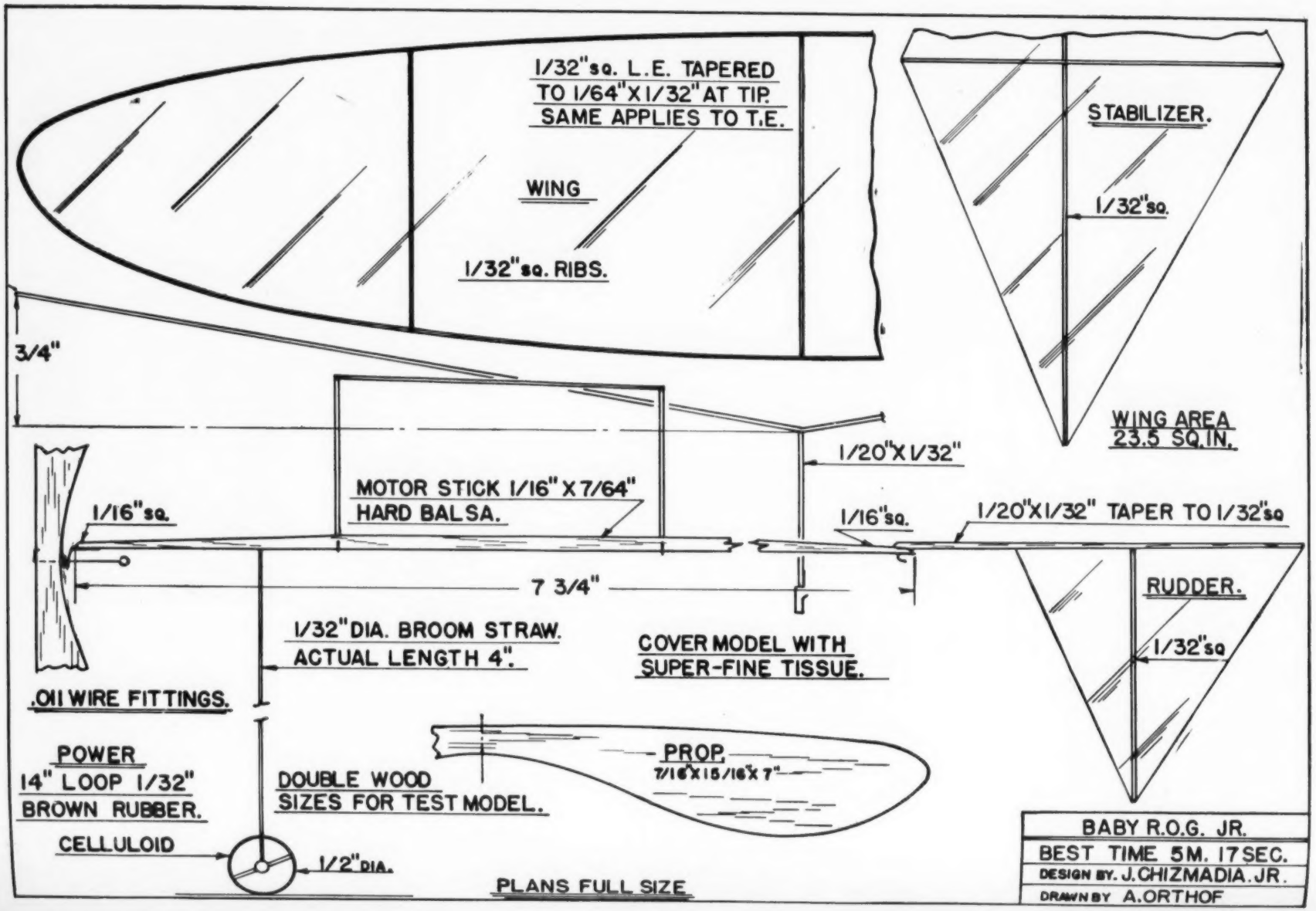
(Continued on page 58)



SLOTTED AIRFOIL BY C.H. GRANT
TESTED BY FRANK EHLING



The wing is made in two parts and then put together to form the slot


1/32"sq. L.E. TAPERED TO 1/64"X1/32" AT TIP. SAME APPLIES TO T.E.
WING
1/32"sq. RIBS.
3/4"
STABILIZER.
1/32"sq.
WING AREA 23.5 SQ.IN.
1/20"X1/32"
MOTOR STICK 1/16" X 7/64" HARD BALSA.
1/16"sq.
1/16"sq.
1/20"X1/32" TAPER TO 1/32"sq
7 3/4"
RUDDER.
1/32"sq
1/32"DIA. BROOM STRAW. ACTUAL LENGTH 4".
COVER MODEL WITH SUPER-FINE TISSUE.
.011 WIRE FITTINGS.
POWER
14" LOOP 1/32" BROWN RUBBER.
PROP.
7/16"X15/16"X 7"
DOUBLE WOOD SIZES FOR TEST MODEL.
CELLULOID
1/2"DIA.
PLANS FULL SIZE
BABY R.O.G. JR.
BEST TIME 5M. 17SEC.
DESIGN BY. J.CHIZMADIA.JR.
DRAWN BY A.ORTHOF

ARTICLE 8

MODEL DESIGNING SIMPLIFIED

Designing the External Contours and Structural Arrangement of a Simple Fuselage Model

By CHARLES HAMPSON GRANT

● So far in this series the design and general layout of a simple fuselage model has been outlined. In article No. 7 the reader was shown the primary steps in laying out the proportions of this airplane. To thoroughly understand this article, it will be helpful if you read the preceding ones.

MANY modelers know thoroughly how to construct fine flying models, without the necessity of following a step by step procedure of design, layout and construction. Designing, to them, has become a natural, intuitive process. However, this system often leads even the expert astray, frequently resulting in the acquisition of many bad habits and actual errors in design.

Briefly, a precise procedure inevitably results in a more perfect airplane, though it may take slightly longer than casual methods. The procedure should be:

1. Determine all aerodynamic factors and proportions of the plane.

2. Make a layout drawing of your airplane, starting first by laying out the basic measurements dictated by aerodynamic requirements.

3. Draw in the external outline of the parts.

4. Determine the type of internal structure to be used. Locate the various individual parts of each unit and insert them in the layout drawing.

We shall now proceed to carry out the last two steps. Start by rounding the wing tips. An arc of a circle may be used, or, if preferred, a parabolic curve as shown in the drawing. In order to have both tips uniform it is wise to cut out a pattern, trim it until you obtain the shape desired, then, using this pattern, lay out the curves on each wing tip. On the drawing, the tips are curved from points, one and a half times the chord from the wing tips, as indicated.

2. Layout the tips of the stabilizer in similar manner, starting the tip curves at points located equi-distance from the longitudinal centerline to the tips.

3. Draw in the propeller outline. The general shape is shown in the plan view; this need not be exact, as propeller details will be laid out later. On the three view drawing only the general outline and position are shown.

4. Lay out the fin outline above the stabilizer in the side view.

5. Draw in the outline of the fuselage. However before this can be done you should have a general idea of its type and construction. This is to be a simple fuselage model, therefore, the construction will not be complicated. One of the simplest types is four flat balsa sides placed around bulkheads, so this will be chosen. The bottom lines of the fuselage under the wing and under the fin have already been established, so draw the lower fuselage contour including these.

At the rear, curve up the fuselage to blend with the fin trailing edge. The nose may be curved to a shape which pleases your fancy. The drawing indicates rather a "snappy" outline, especially when a spinner is used on the propeller. The top fuselage contour should be flat and horizontal under the wing, providing a rest for the wing mount, so it may be slid backward and forward slightly for adjustment. Make this line straight for a distance of half the chord in front and back of the wing. Then at the rear, curve this line gently downward to the stabilizer. At the front, curve it to blend with the propeller spinner.

6. Determine the number of bulkheads and locate them. Bulkheads are usually placed where pressure or tension stresses are centered; such as directly under the front and rear wing spars, or over landing gear struts, or under the stabilizer. Other bulkheads should be distributed between these points. An excellent arrangement is shown in the side view drawing, which also indicates the type of nose block and propeller spinner to use. A bearing plug may be used in order to stretch out the motor for winding.

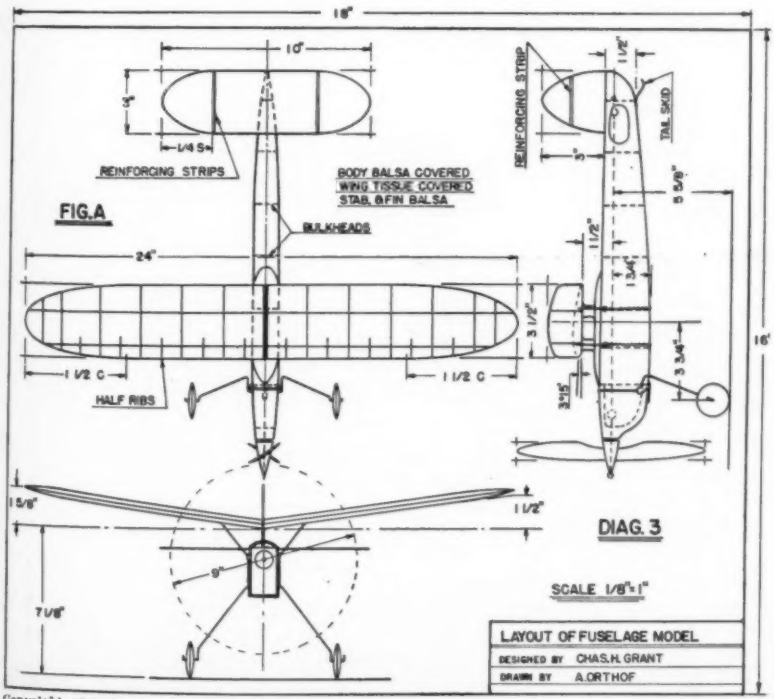
Now indicate the centerlines of the bulkheads and general contours of the nose block and plug. Next indicate the propeller shaft, which should be long enough to protrude from the rear face of the bearing plug so there will be no interference with the hook and rubber when turning.

Then indicate the rear motor hook which should be fastened to the rear bulkhead. The tail skid should also be included. Insert this and other parts carefully; remember they must be attached to some rigid part and in a manner that will give proper strength. In this case the skid can be cemented to the rear bulkhead; extending out of the bottom of the fuselage, and rearward down.

7. Draw in the outline of the propeller as in the plain view.

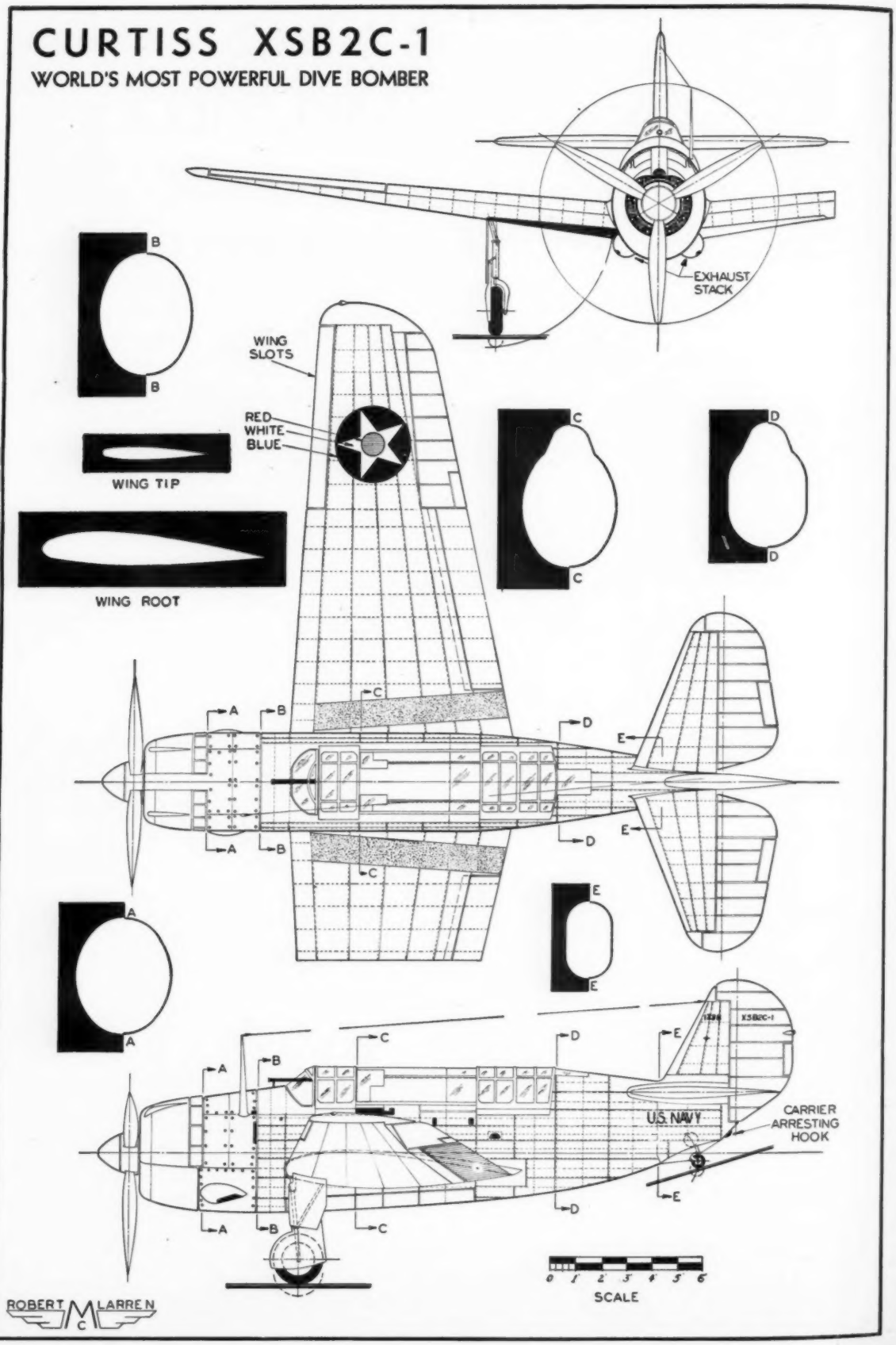
8. Draw in the centerline of the landing gear struts. This unit will be made of wire, extending from one wheel upward across the underside of the lower contour and downward to the other wheel. A single- or double-strut gear may be used; the landing gear should be quite simple therefore a single-strut arrangement is advisable. Its location is indicated in the plan view. Note that it contacts the fuselage lower contour at the bulkheads; never

(Continued on page 63)



CURTISS XSB2C-1

WORLD'S MOST POWERFUL DIVE BOMBER



By ROBERT McLARREN

Dive-Bomber De Luxe

The Plane On The Cover

THE mind of the inventive is that of the American. But the mind of utility is that of the German. The American seems, on a hundredfold counts, at a loss to know what to do with the fruits of his inventive labors: Our patent office files are more than four times as large as all the rest of the world combined, but only fourteen per-cent of all American patents have ever been successfully marketed. This queer aspect of the American mind is only offset by its ability to improve on anything it studies. And thus a strange mechanical formula has been built up through the years: "Let the Americans think of it, the Germans use it, and then only will the American improve on it!"

And particularly in the air has this strange circuitous route played a part in America's aeronautical engineering career. We were the first to formulate and engineer vast majority of aviation designs, appliances and tactics but we have invariably been the last to use them. The first airplane, first airplane motor, first seaplane, first aircraft carrier, first parachute troop, first combat plane, first glider train, first parachute, first retractable landing gear, first aerial cannon, first attack plane, first bomber and the first dive-bomber raiding plane are all American in practical origin.

The world's first dive-bomber, an airplane which releases its destructive load while in a dive and which aims the plane's nose at the target rather than a bomb-sight, was the Curtiss O2C-1 "Helldiver"; a single-engine, two-place biplane landplane first introduced in 1930, three years before Hitler had even become known to the German people. Copying this design, as well as parachute troops, mechanized "panzar" troops, engineering corps which bridge streams before the main body of troops arrive, and a dozen other items of warfare, the Nazi "Stuka" dive-bomber severed the jugular vein of Poland and established Hitler firmly as an aggressive world figure. Again in France, Norway and in the early stages of the Battle for Britain he used the Junkers JU-87B dive-bomber to lead his aerial attack.

With the astounding success of this weapon of war, American military turned hurriedly to copying the design which, years before, they themselves had first thought of, and even laid down the specifications for this "new" type plane in terms of the Stuka!

For the original Bureau of Aeronautics, U.S. Navy, circular proposal which was distributed to seven American manufacturers, was coached in terms which read: "at least 50% more than the German 'Stuka'," etc., etc.

Actually, the specifications called for the following: Top speed at least one hundred miles per hour more than, a bomb load twice as great as and a range twice as long as that of similar planes abroad particularly such planes in the German Luftwaffe. Based upon known

(Continued on page 48)

SO—WHERE WILL YOU FLY? Asks the INSTRUCTOR

THIS is no time for the old professor to say, "I told you so!" But we can't help feeling that lots of folks are going to wake up some of these fine mornings mighty surprised.

Remember that article on "More Model Airports" that the editors of MODEL AIRPLANE NEWS called to your attention recently? Maybe you thought it was all very nice, but that you wouldn't have to worry about a flying field for awhile—you seemed pretty well established in your present site.

Maybe you're still safe, brother, but there are plenty of other modelers who are out looking for another flying field these days.

Here's an example—

The South Jersey Gas Model Airplane Association has been holding its meets for the past few years at Pine Valley Airport in Berlin, N.J. But no more. After their last Spring meet, the field was closed to the club for invitation meets.

Why? Just plain downright cussedness on the part of a lot of unthinking model builders. The S.J.G.M.A.A. members used Pine Valley for years with few complaints. The Berlin barracks of the State police system were most helpful; so few "lost" models were reported in that area. But came big invitation meets with "outsiders" coming in to compete and immediately a loud howl arose from the many farmers who gain their living from large planted tracts around Pine Valley.

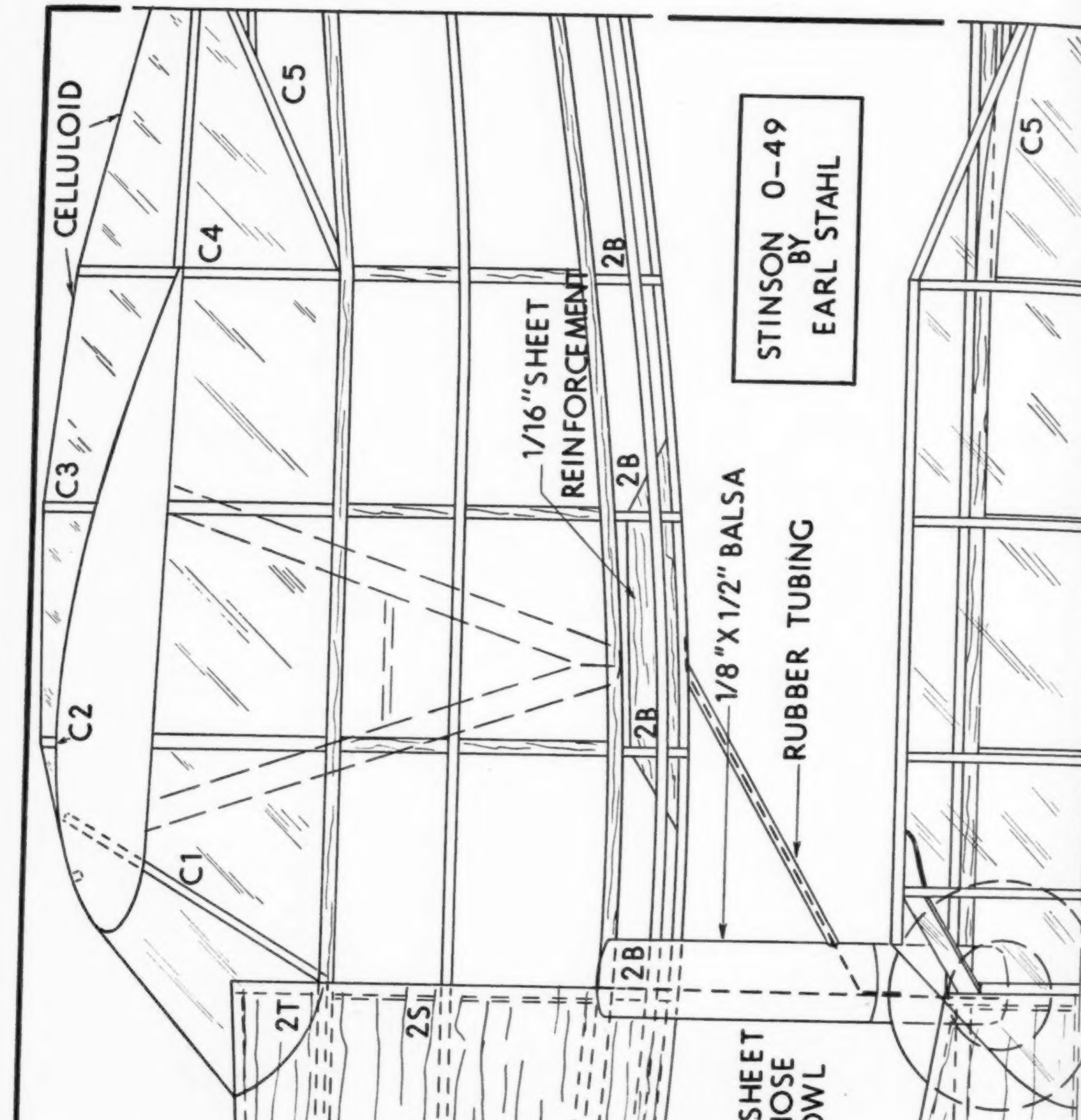
Visiting model builders just didn't give a hoot about growing crops, it seemed. Model land in a tomato patch? Just plow right through, brother, never mind knocking down and trampling a couple of plants. Same with a bean patch—run right across it.

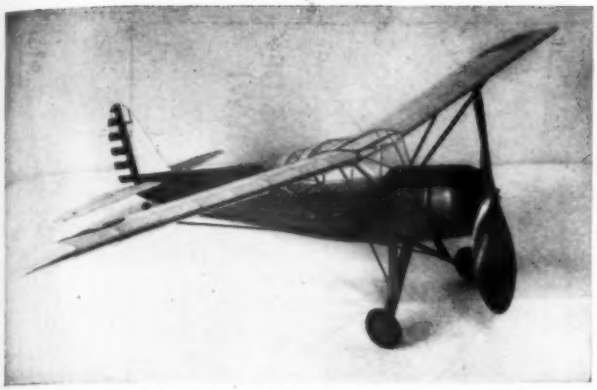
So it was actions like that that lost Pine Valley to the S.J.G.M.A.A. At last account, the club was in search of another field—but we sorta feel it would have been better if they had been in search of a more decent type of contest flyer—one who understands values and realizes that with farmers, crops come first, modeling second.

Another indication that the activity can outgrow its shoes is exampled by the Silver Spring (Md.) Aeronauts who lost their fine flying field at White Oaks, Md. The model airport was once a commercial flying field and represented one of the best available competition spots in the Washington, D.C., area. But when the competitions got too large, and the spectator crowds too great, the activity had to move on.

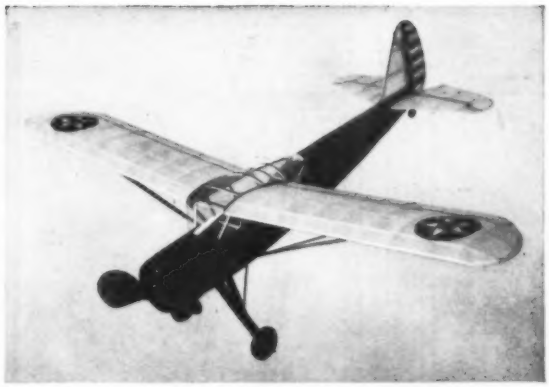
It is well to consider all this when searching for the perfect model flying site

(Continued on page 34)


STINSON O-49
BY
EARL STAHL
CELLULOID
C1
C2
C3
C4
C5
C5
1/16" SHEET
REINFORCEMENT
2B
2B
2B
2B
2B
1/8" X 1/2" BALSA
RUBBER TUBING
1/32" SHEET
ON NOSE
& COWL
2T
2S
1T
1S
1B
NOSE PLUG
ALL SECTIONS
FORWARD OF
#1 ARE CIRCULAR



Structural details and insignia make it very realistic



The long fuselage can house a long powerful motor

A MINIATURE FLYING STINSON O-49

A Detailed Model of a U. S. Military Plane Especially Suitable for Flying Scale Contests

By EARL STAHL

NEWEST type observation plane for the United States Army Air Corps is the Stinson O-49 now being produced in quantity by Stinson Division of Vultee Aircraft Inc. Former observation planes of larger sizes and greater speeds heretofore purchased by the Army are not able to use the small fields usually found in the occupied areas; for that reason fast, large ships are not adaptable to work with infantry divisions. The Stinson O-49, designed not only to cooperate with the infantry but also to adjust artillery fire, is a short range, highly maneuverable plane featuring short landings and quick takeoffs.

Contrary to the recent trend to low-wing designs for military aircraft, this plane is a high-wing job of conventional construction. Pilot and observer are seated in tandem in a rather large cabin which features exceptional visability. Two-way radio is installed and the ship is said to be unarmed. Automatic-type slots span the wing's entire leading edge and huge flaps extend inboard to the fuselage from the ailerons. The power plant is a nine cylinder, air-cooled Lycoming of 280 horsepower.

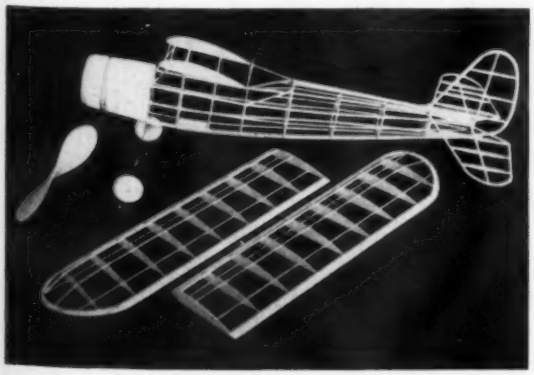
Due to military regulations, official performance figures have not been divulged; however, one should obtain a rather accurate estimate of performance by comparing the O-49 with the Feiseler "Storch," a similar type plane used by the German Army. With a 200 horsepower engine the "Storch" has a top speed of 120 miles per hour; it takes off as readily as an autogiro and climbs at a very steep angle. Landing speed is 20 m.p.h. after a gliding approach that appears to be nearly vertical. The excellent aerodynamic design and additional power of the Stinson should make a speed of 130 m.p.h. possible with the landing speed probably not exceeding 30 m.p.h.

Model builders will recognize the Stinson O-49 as an excellent subject for a

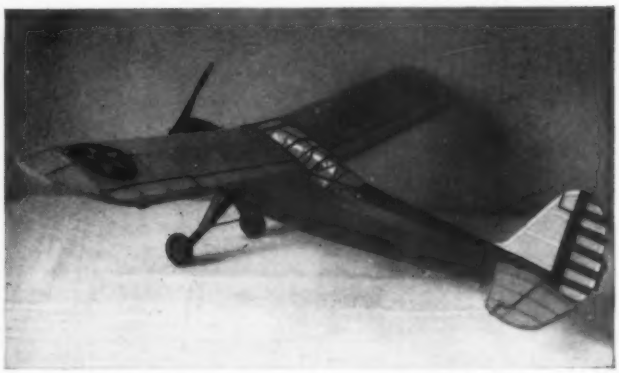
(Continued on page 44)

Just like a big ship in flight

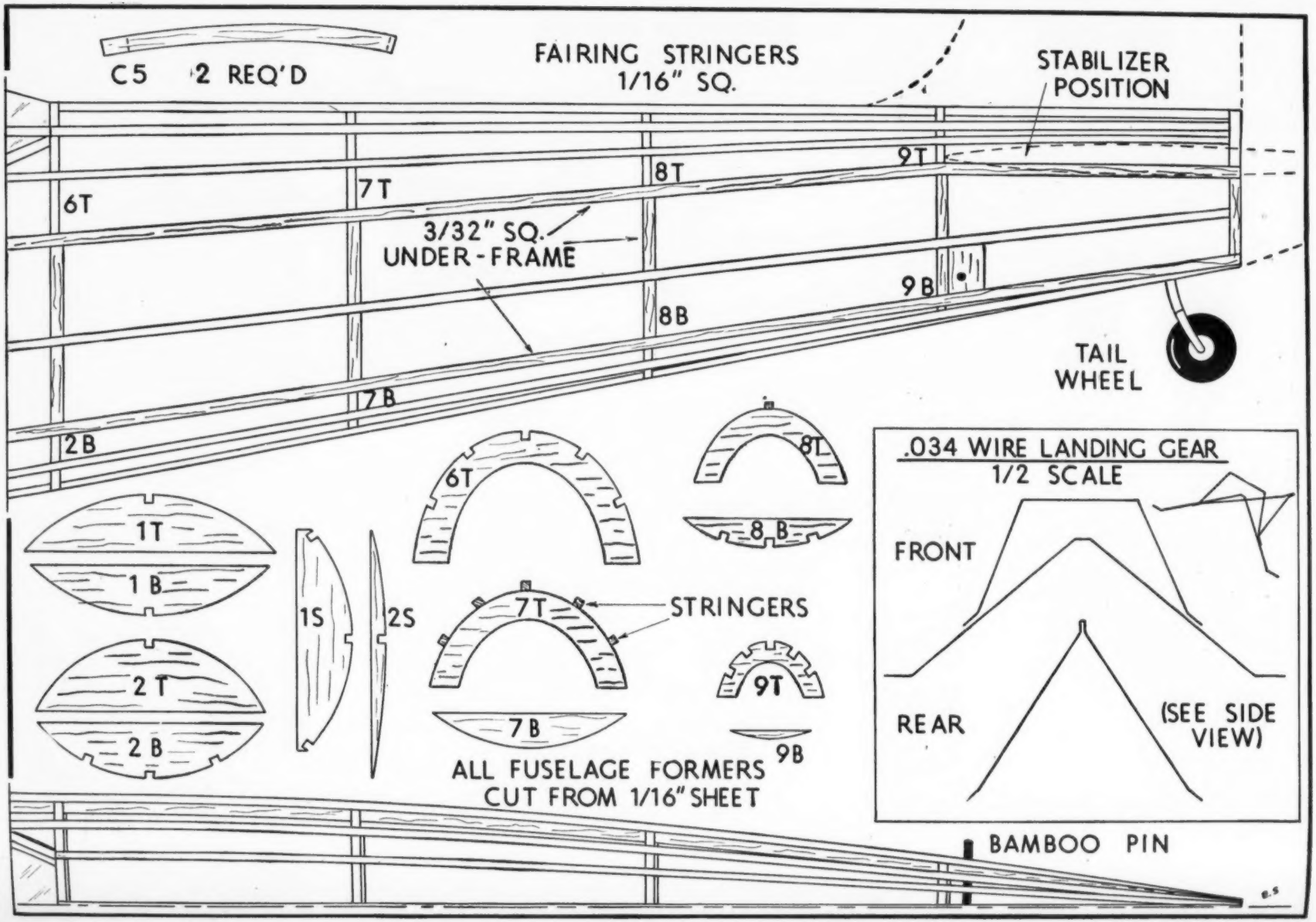
Exactly to scale, without increased dihedral

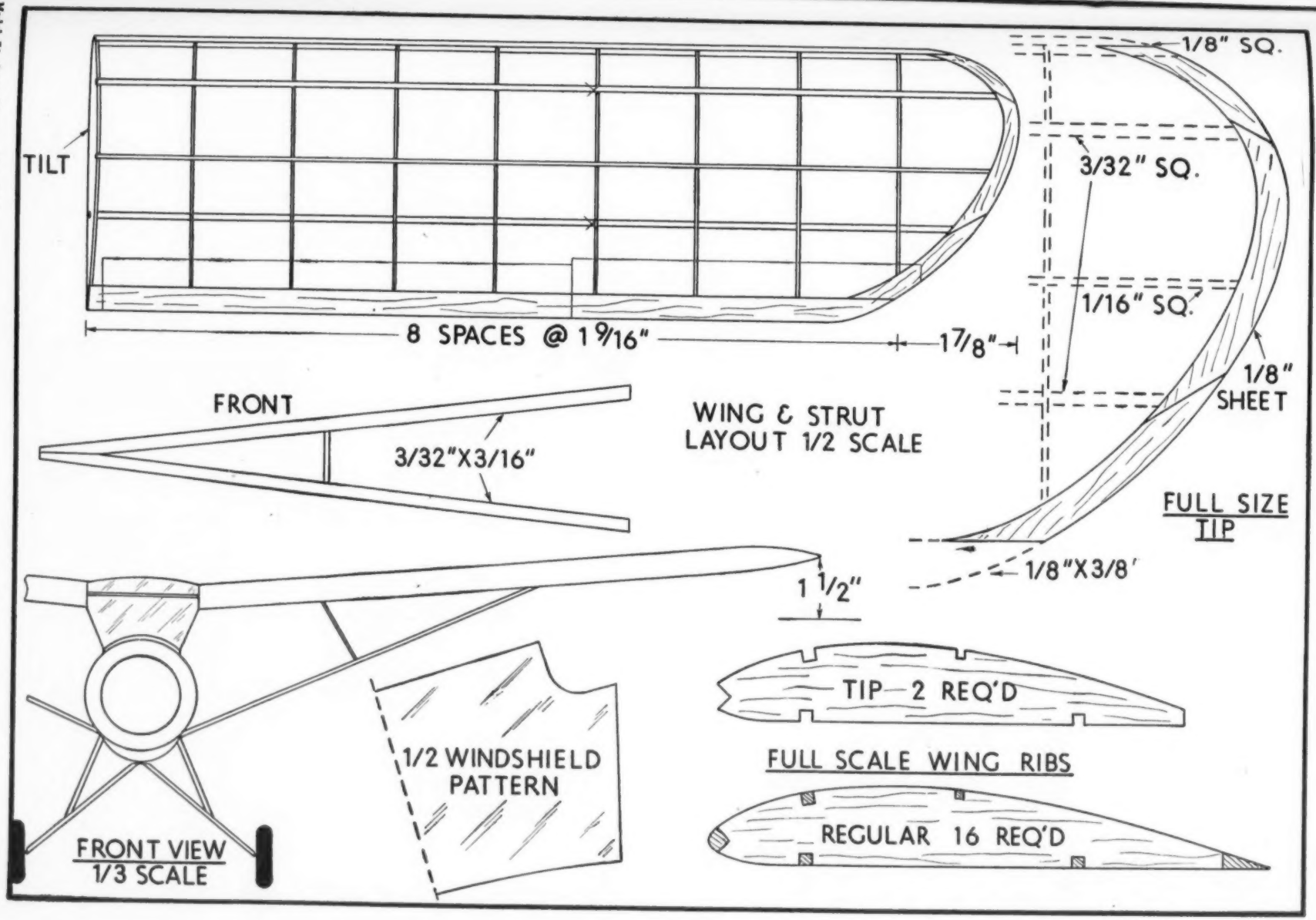


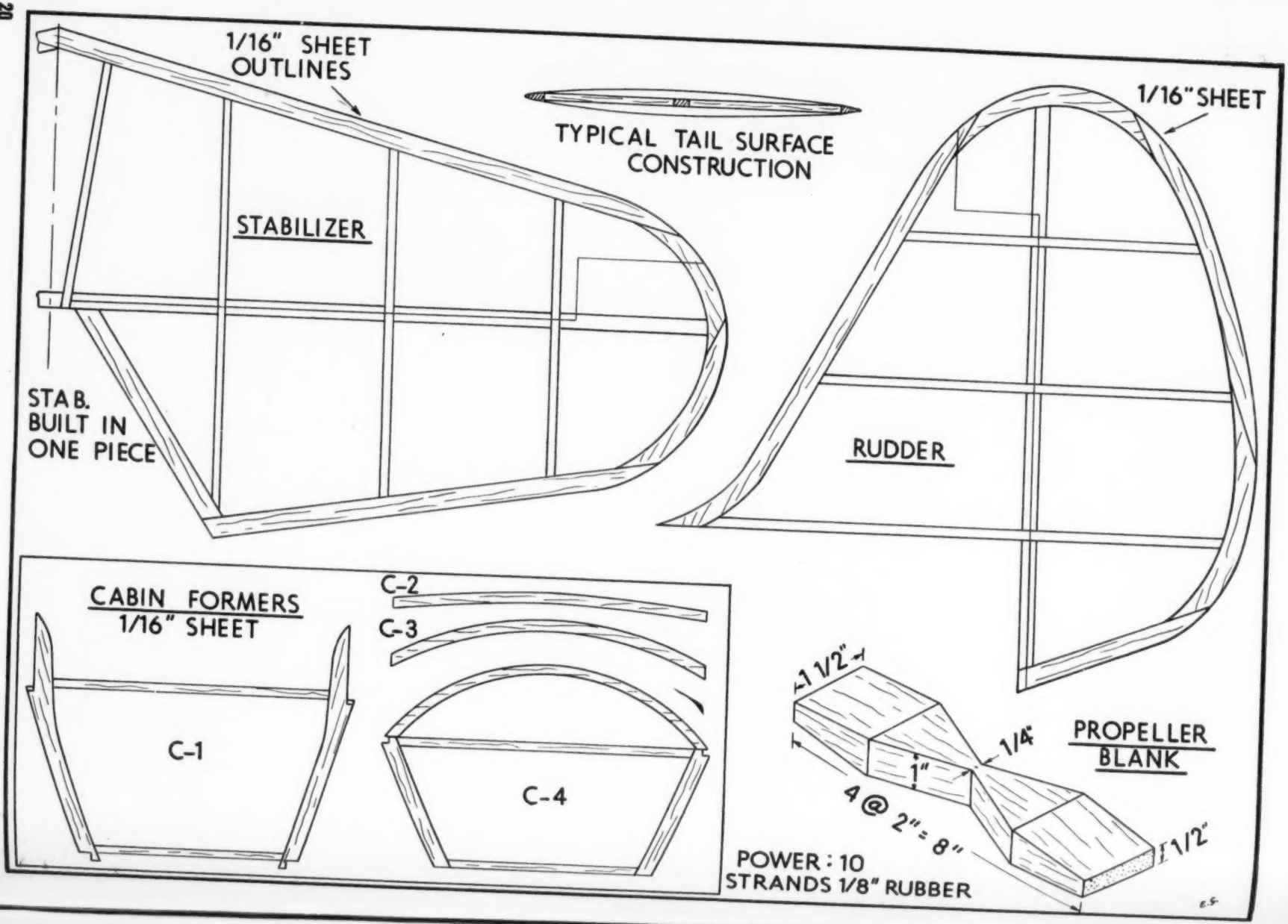
The frame is simply but well designed



The long tail moment arm gives exceptional stability


C5 2 REQ'D
FAIRING STRINGERS 1/16" SQ.
STABILIZER POSITION
6T
7T
8T
9T
3/32" SQ. UNDER-FRAME
9B
8B
7B
2B
TAIL WHEEL
.034 WIRE LANDING GEAR
1/2 SCALE
FRONT
REAR
(SEE SIDE VIEW)
1T
1B
2T
2B
1S
2S
6T
8T
8B
7T
STRINGERS
9T
7B
9B
ALL FUSELAGE FORMERS CUT FROM 1/16" SHEET
BAMBOO PIN


TILT
8 SPACES @ 1 9/16"
1 7/8"
1/8" SQ.
3/32" SQ.
1/16" SQ.
1/8" SHEET
FRONT
3/32"X3/16"
WING & STRUT LAYOUT 1/2 SCALE
FULL SIZE TIP
1/8"X3/8'
1 1/2"
TIP—2 REQ'D
1/2 WINDSHIELD PATTERN
FULL SCALE WING RIBS
REGULAR 16 REQ'D
FRONT VIEW 1/3 SCALE


1/16" SHEET OUTLINES
STABILIZER
STAB. BUILT IN ONE PIECE
TYPICAL TAIL SURFACE CONSTRUCTION
1/16" SHEET
RUDDER
CABIN FORMERS 1/16" SHEET
C-1
C-2
C-3
C-4
1 1/2"
1/4"
1"
4 @ 2" = 8"
1 1/2"
PROPELLER BLANK
POWER : 10 STRANDS 1/8" RUBBER

FRONTIERS

Highlights of the Latest Developments in Aviation

By ROBERT C. MORRISON

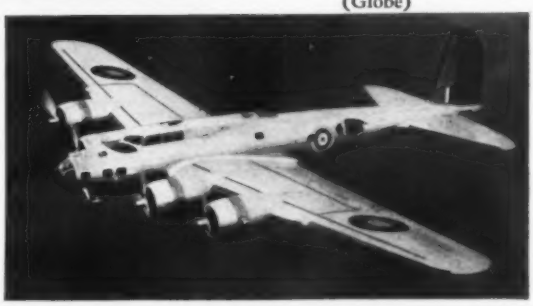
British Fleet Air Arm's latest torpedo carrier, "Albacore" in flight with torpedo in position for launching (B.C.P.)

Sikorsky in his helicopter going no place and breaking world's record with a flight of more than 1 hr. 30 min. (Acme)

IT IS a known fact that we have the greatest naval air service in the world. The Navy's flying equipment has always been maintained up-to-date, new aircraft and carriers have constantly been added to the fleet . . . and of course, in this present "emergency," the new ships and aircraft now being built or on order is stupendous! Exemplifying this are the numerous experimental naval fighting planes that will take the air this year; such as the Boeing XPBB-1 patrol bomber, Consolidated PBY-5 patrol bomber, Grumman XTBF-1, Vought-Sikorsky XTBU-1, (both torpedo bombers), Consolidated PB2Y-3 patrol bomber, Martin PBM-2 patrol bomber, Brewster SB2A-1 scout-bomber, Naval Aircraft Factory SBN-1 scout-bomber, North American SNJ-3 scout-trainer, Grumman F4F-5 fighter, Brewster F2A-3 fighter, Douglas SBD-3 scout-bomber, Martin XPB2M-1 patrol bomber, Curtiss SNC-1 and perhaps the new Freeman Aircraft Co. dive-bomber may interest the U. S. Navy. Aircraft carriers under construction include such names as "Essex," "Hornet," "Bon Homme Richard," "Intrepid," "Franklin," "Ticonderoga," "Randolph," "Bunker Hill," "Kearsarge," "Oriskany" and "Cabot." These carriers will range between 25,000 and 26,000 tons, which are much larger than any of our other carriers in service except the "Lexington" and "Saratoga," which weigh about 33,000 tons each. The "Wasp," our smallest which incidentally carries the largest quota of aircraft, weighs in the neighborhood of 15,000 tons. But that is not all the carriers we will have in commission within the next few years. Right now the Navy is revamping the "S.S. Mormacmail" as a thirty-plane carrier, two-thirds the size of the small Wasp. It cost the Navy $3,000,000 to purchase this former Type C-2 freighter, and it is expected that the ship will be on the high seas in a couple of months as an aircraft carrier! If experiments are successful with a light, fast, unarmored plane carrier of this type, either 16 or 30 more freighters of like design will be converted. These would be used to accompany convoys and search for those dangerous "steel whales." There are several freighters now abuilding that have been designed in order that they may be readily converted into aircraft carriers, and in all likeliness, before they are completed, they will make the "change over." Of course many of these are likely to be destined for Great Britain in her still-losing struggle. It may be a ship of this sort that will win the day for her, for once the U-boat has found it impossible to hide its black hulk from searching carrier aircraft the British situation is going to appear more hopeful. The Navy has operated for years on end with about two seaplane tenders, which is about two more than any other country operates, but now, to

(Continued on page 60)

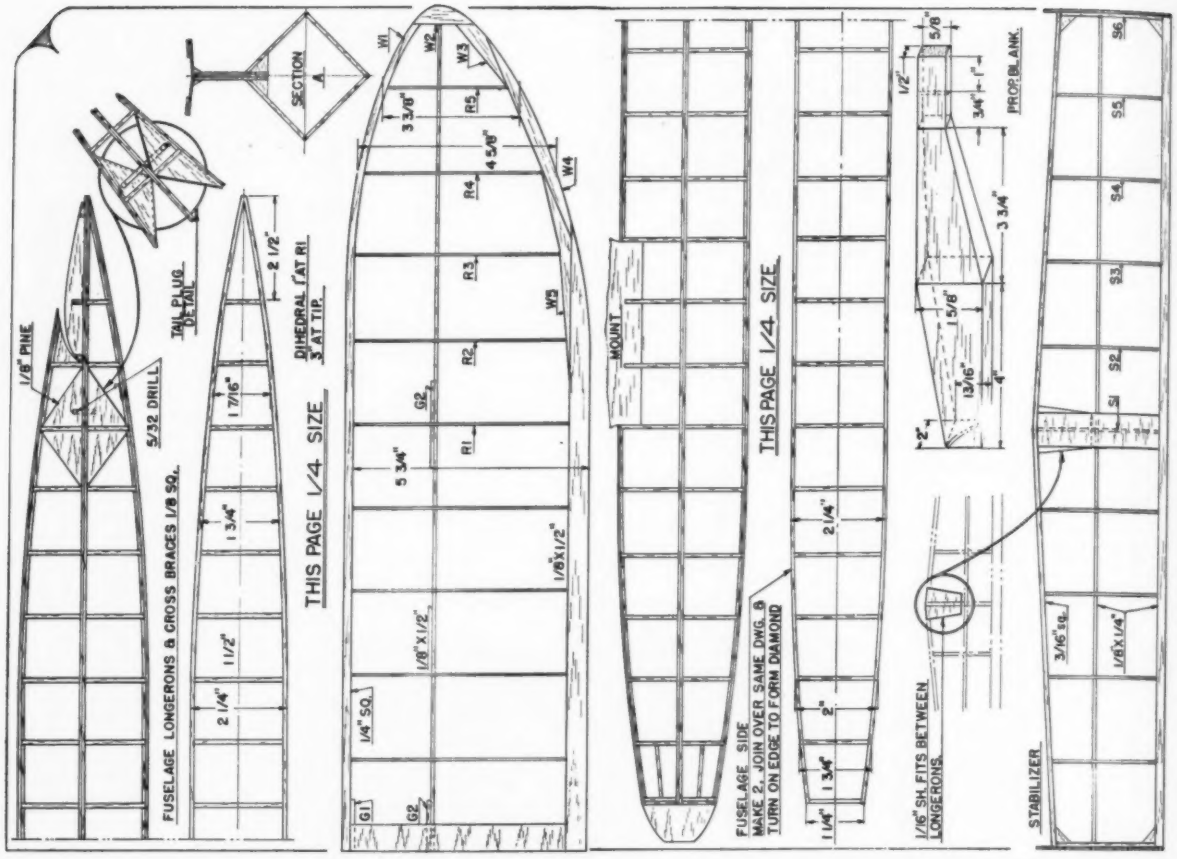
The 40,000 lb. Martin patrol bomber PBM which carries 3 to 5 tons of bombs (F.P.G.)

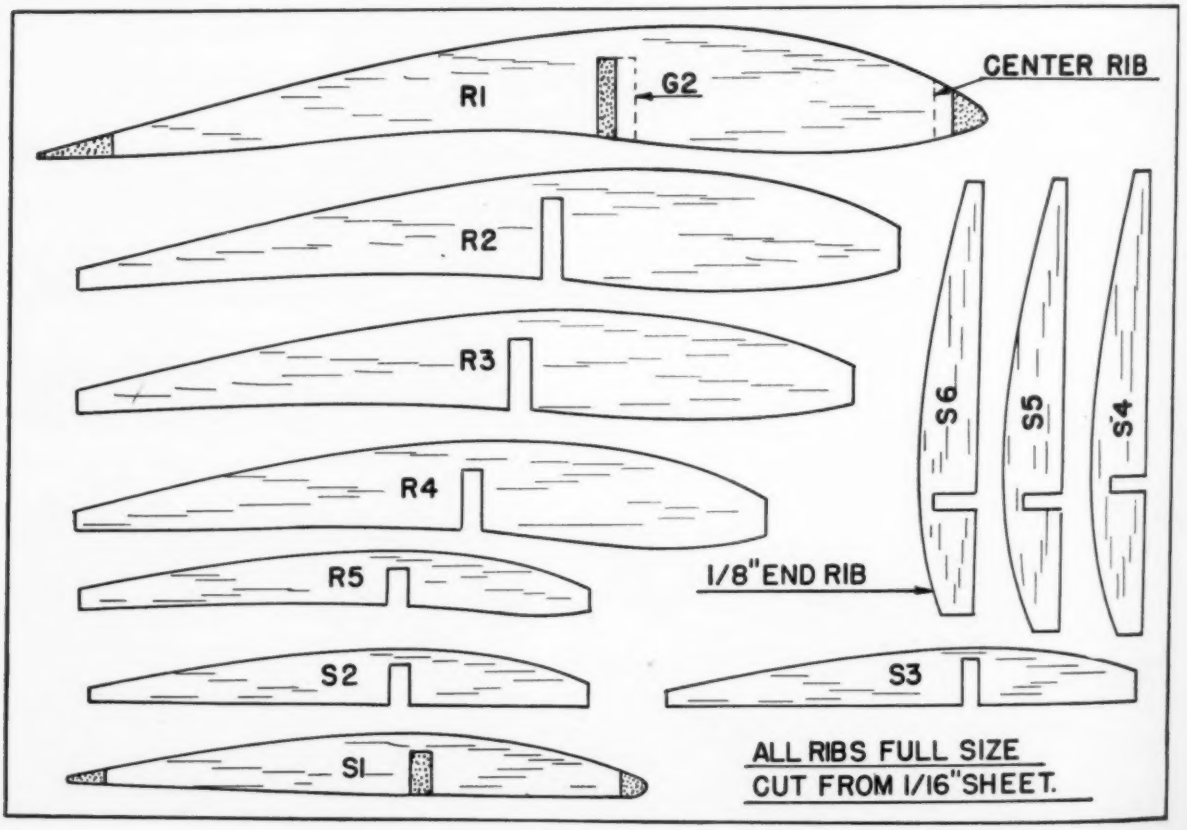


The latest Boeing flying fortress flying for Britain at 300 m.p.h. (Globe)

The Curtiss XSB2C-1 dive bomber showing wing tip slots which keep air flow smooth over the ailerons

The two main assembly lines of the Bell Aircraft Co. turning out Airacobras (P-39)


SECTION A-A
1/8" PINE
TAIL PLUG OF TAIL
5/32 DRILL
FUSELAGE LONGERONS & CROSS BRACES 1/8 SQ.
2 1/2"
1 7/16"
1 3/4"
1 1/2"
2 1/4"
DIHEDRAL 1" AT R1
3" AT TIP
THIS PAGE 1/4 SIZE
W1
W2
W3
R5
3 3/8"
4 5/8"
W4
R4
R3
W5
R2
G2
R1
5 3/4"
1/8"X1/2"
1/4" SQ.
G1
MOUNT
THIS PAGE 1/4 SIZE
FUSELAGE SIDE
MAKE 2, JOIN OVER SAME DWG. B
TURN ON EDGE TO FORM DIAMOND
2 1/4"
2"
1 3/4"
1 1/4"
1/2"
5/8"
3/4"
1"
PROP BLANK
3 3/4"
1 5/8"
1 3/16"
4"
2"
1/16" SH. FITS BETWEEN LONGERONS
S6
S5
S4
S3
S2
S1
3/16" sq.
1/8"X1/4"
STABILIZER


CENTER RIB
R1
G2
R2
R3
R4
R5
S2
S1
S6
S5
S4
S3
1/8" END RIB
ALL RIBS FULL SIZE
CUT FROM 1/16" SHEET.

The model in full flight

A STICK CONTEST WINNER

A Consistent Winner at Many Contests—It Is Especially Suitable As a Nationals Contender

By REID HULL

ALTHOUGH it has been entered in only two contests, this model has made a three flight average of 2' 17" compared to the 35" flight of its nearest competitor at Knoxville, Tenn., and 5' 43" compared to the 1' 33" flight of its nearest competitor at Chattanooga. At the Chattanooga contest, the model was lost on its second official flight, disappearing from sight in 13'. The model has won merchandise, as well as corralling the East Tennessee Ace Trophy. Build it and watch it help you win some mighty fine prizes—and possibly break a few records? Proceed in the following manner.

The little plane and two awards it has won

Construction

Before starting construction it is best to study the drawings, instructions and photos of the framework until you understand them thoroughly.

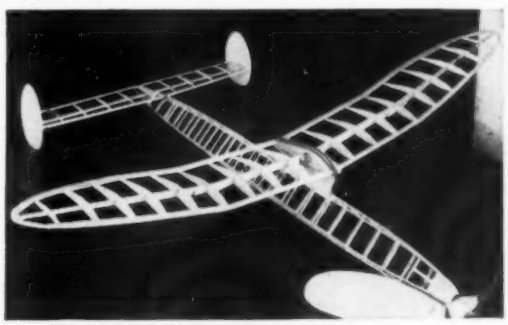
Now, on a large sheet of plain paper, you may scale the plans to full size. A soft pine board (or piece of fiber board is better) 10" x 36" or larger may be used as a work board.

Fuselage

Since it is the most difficult to construct, we chose the fuselage first. Lay down your scaled-up plans and cover them with wax paper, which is used to prevent cement from sticking to the plans. Now lay down the longerons of 1/8" square hard balsa after which crossbraces of 1/8" square medium balsa are cut to size. Cement these in place. Note there are two crossbraces cemented together at the nose; make a perfect fit here to withstand abuse. When cementing crossbraces in apply cement on either end then place one end in place, remove it and then place the other end in first, sliding the crossbrace in place.

This idea of construction is used throughout to prevent cement from being scraped out on top of your work when cemented pieces are in place; it also makes construction much stronger. Make two identical sides, allowing each to dry an hour before being taken up from the workboard. Now turn the sides on edge and join over the same drawing, forming the perfectly square fuselage from nose to tail. Let this dry thoroughly before removing from the workboard.

We are now ready for the wing mount, which is started by making two sides of 1/16" medium sheet balsa, as indicated full scale on the plans, with the grain running up and down and one side of 1/8" soft sheet with the grain running lengthwise. A 1/8" strip is cut out of the 1/8" sheet side, as indicated on the plans, and the upper piece is cemented in place between the 1/16" sheet sides. The idea is to sandwich the 1/8" sheet between the two 1/16" sheet sides in order to allow space between them for the top longeron (whichever is chosen) and not cut it into lowering the strength of the fuselage.



The construction is unique, simple and light

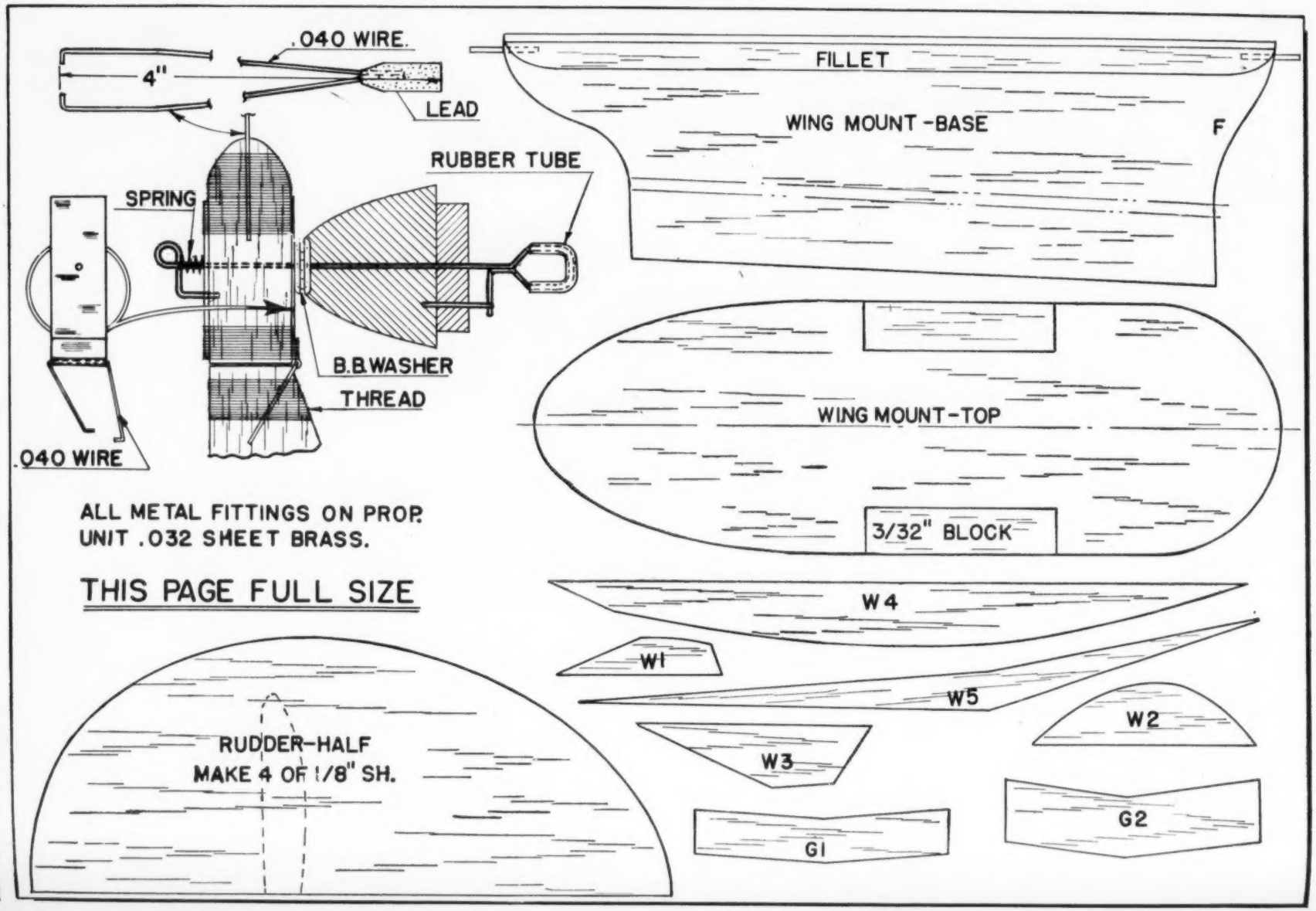
Now you can cut the two crossbraces on either side of the top longeron between the ends of the wing mount placement, as indicated on the plans. Bevel right and left edges of the longeron where mount is to be placed. Apply cement to the top of the longeron where it has been beveled and slide the part of the mount which has been cemented together down over it, seeing that the mount is straight up and down; that is, perpendicular to an imaginary line drawn between the right and left longerons. Be sure the mount dries in alignment before bothering it again. Now, after coating it with cement, place the small piece of 1/8" sheet left in place in the bottom of the mount under the longeron. Make the top of the mount of 1/16" medium sheet as indicated on the plans full size, cut into at the center, coat the cut edges with cement and rejoin, turning up either edge 1/8".

After this has dried cement it in place on top of the mount and then cement a triangular fillet made from a 1/4" square balsa strip which has been made to fit under either side of it for greater strength. Cement the four crossbraces back in place, after they have been cut, till they will resume their original position only against the side of the wing mount instead of the longeron. Also cement 1/8" sheet triangles inside the fuselage at either end of the mount just large enough to reach the bottom of the mount in order to decrease the likelihood of the mount twisting loose.

Now for the stabilizer and tail plug mounting. The tail plug mountings are made from 1/8" sheet pine, cut into triangles as indicated full size on the plans. The mounting on the left side (looking from the rear) is above the left longeron and the one on the right side is below the right longeron and inverted. 5/32" holes

(Continued on page 56)

Builder and the winning model


.040 WIRE.
4"
LEAD
RUBBER TUBE
SPRING
B.B.WASHER
THREAD
.040 WIRE
FILLET
WING MOUNT-BASE
F
WING MOUNT-TOP
3/32" BLOCK
ALL METAL FITTINGS ON PROP. UNIT .032 SHEET BRASS.
THIS PAGE FULL SIZE
W4
W1
W5
W2
W3
G2
G1
RUDDER-HALF
MAKE 4 OF 1/8" SH.

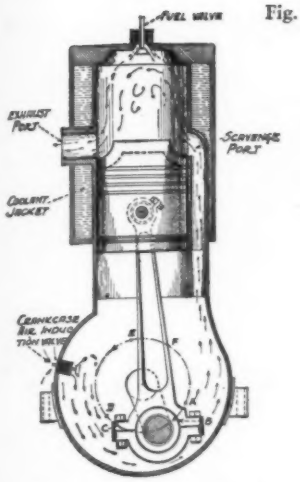


Fig. 2. A compression-ignition (Diesel) engine and timing diagram

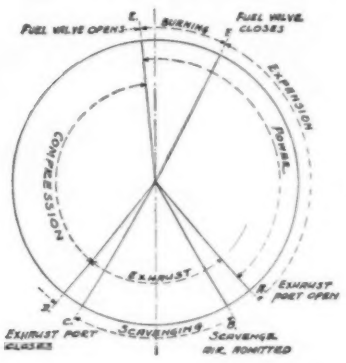
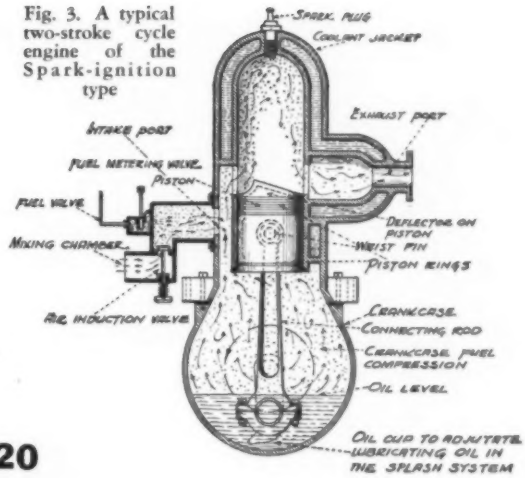


Fig. 3. A typical two-stroke cycle engine of the Spark-ignition type



ARTICLE 20

The Physics of the Airplane

HEAT AND WORK

By LT. JAMES P. EAMES and WILLIS L. NYE

IT IS universally known that a substance, regardless of classification of matter it represents, will expand under the influence of applied heat. This phenomenon can be made to perform a useful function in many instances where mechanical devices are concerned.

Aluminum and aluminum alloys, solid substances, are used for cylinder head material in aircraft engines, not only because of an inherently low weight, but mainly because these materials offer certain advantages in the engine where extreme temperatures are present. They have certain well-merited functions to perform in this capacity. The aluminum cylinder heads are shrunk-fit to an alloy steel cylinder barrel. Applied while heated, the aluminum alloy heads are threaded onto the barrel, and when they cool they grip the steel barrel tightly and permanently.

Conversely, the pistons in an aircraft power plant expand, absorbing a proportion of the fuel combustion heat in the chamber. This expansion requires a specific clearance value between the pistons and the cylinder walls so they will not come so close that a "seizure" results.

It is reasonable to assume that all materials will not show a comparable expansion at the same rate or to the same limit when subjected to the action of an applied heat. In the case of the composite aircraft engine cylinder, the aluminum alloy cylinder head, located in the region of highest combustion temperature, will tend to expand at a disproportionate rate, much faster than the steel alloy cylinder sleeve. The latter is subjected to a far lower temperature in the course of ordinary engine operation.

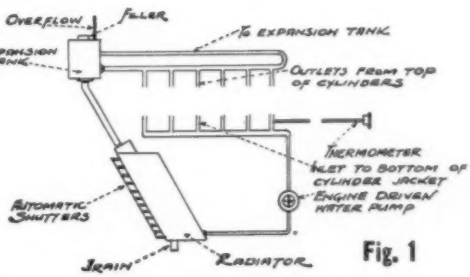


Fig. 1

Typical cooling system for liquid cooled engine

Should a steel cylinder head be installed, this unequal temperature distribution would tend to cause an unequal rate of expansion, with the head subsequently becoming heated enough to draw away from the cylinder sleeve or lower trunk. However, aluminum has a different coefficient of expansion than steel, so its selection as cylinder head material is understood.

The term "coefficient of thermal expansion" is defined as the increase in length per unit length of a bar of homogeneous material for 1° rise in the material temperature. This coefficient is constantly used in aircraft engine design and in steam, diesel or spark-ignition internal combustion engines.

Another pertinent phenomenon entering into the calculations of the aircraft engine designer lies in the transfer of heat and the rate of transfer. Briefly, heat is transferred from one body or place to another in any one of three ways:

1. By convection or movement of the heated substance.
2. Conduction.
3. Radiation.

An example of the first is the heating of a gas so that it expands and becomes lighter than the original colder gas; or to put it in another way, a change of density occurs.

The science of aerometeorology deals with convection currents in the atmosphere. Cold fronts and thermals are two terms frequently heard, designating in the first case a mass of low temperature air, and in the second a rising current of

(Continued on page 52)

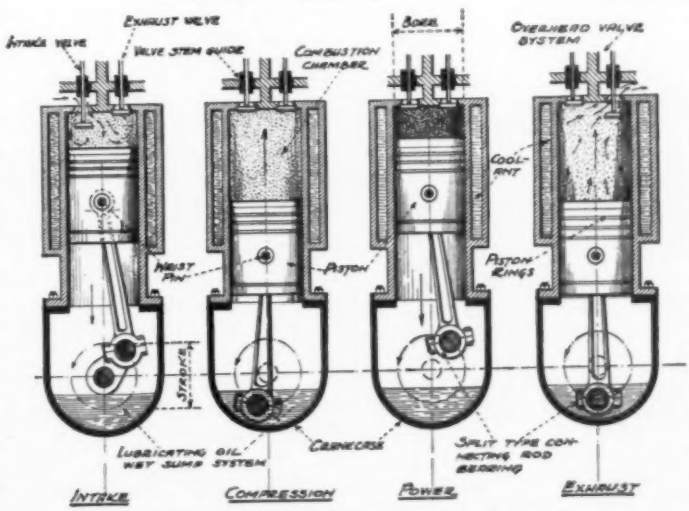


Fig. 4. A typical four-stroke cycle spark ignition engine

GAS LINES

AIR WAYS

NEWS OF MODELS AND BUILDERS FROM ALL PARTS OF THE WORLD

Pict. 1. Paul Gambill's unique amphibian climbing after take off

AT PRESENT, without question, model builders' greatest need is model airports. MODEL AIRPLANE NEWS, in previous issues, has discussed this problem at considerable length; in this issue "The Instructor" also makes some very pertinent comments on the subject.

There will be many who will think there should be a curtailment in model activities, because of war urgencies; but such persons will not fully realize the importance of model aviation in our defense preparations: It is essential if we are to have a large and unlimited number of young men trained in basic principles of aviation for future defense activities, that model designing, building and flying is carried on with ever-increasing intensity. Because many people do not realize the value of this sport they are relegating it to the background; flying fields which formerly permitted model flying now are being limited to training pilots and other activities pertinent to large craft. Consequently, modelers are "going begging" for suitable places to fly their ships.

Obviously model builders should have airports of their own—and to say that this is impossible and impractical is merely dodging the issue—for we have before us a striking example of what can be done when modelers are determined to "carry on."

Pict. 4. A twin tandem Atom powered Class A. Contest model by George and Bob Hemphill

We refer specifically to the Twin City Model Airport, private airport of the St. Paul Modelers Club. This club had difficulties at its former flying field, so it rented 40 acres of open land, 2 miles from town, for $100 a year. Now the boys are soliciting donations of $1 to $5 to cover this cost. The club has been incorporated, fee for which was less than $25. In getting the project started, the procedure suggested sometime back in MODEL AIRPLANE NEWS was followed, namely, club members approached the St. Paul Chamber of Commerce and solicited its backing for the project; as well as that of the Minneapolis National Aeronautic Association unit. The Twin City Horseshoe and Archery Associations were also contacted. An excellent sales job was done, for these organizations are now "putting their shoulders to the wheel" to help put over the undertaking.

As well as the flying field, the airport will include areas for dart baseball, archery, horseshoes, race track, soft drink stand and comfort stations. Business concerns are contributing the necessary materials.

We wish to commend not only this club for its initiative in organizing this project, but its business men and organizations who are far-seeing enough to get behind it. There has been a great deal of talk about civic activities and improving American youth, but most of it has been "lip service." Apparently after feelings of this nature have been relieved by eloquent rhetoric, there hasn't been enough determination and push to follow it up with action. We wish to draw attention of all communities to the pioneer work of St. Paul and Minneapolis in establishing this worthy project; we sincerely hope other communities will follow this example. Results of such a venture are manifold; it provides healthful outdoor activity, an outlet for individual initiative and ideas not possible in the school curriculum, and draws together in a single purpose the youth and adults of any locality. The

Picts. 5 and 6. Mr. Kitchel with his fleet of miniature planes and a 6" Handley Page bomber

Pict. 7. Miss Jeannette Eastman with her prize winning scale model and two trophies won

Pict. 8. Here's a 60 m. p. h. four foot span three wheel gas job designed by C. H. Grant and built by Sal Taibi. It climbs at 45° and is very stable

Pict. 2. Dion with his 86 in. span twin tandem model

Pict. 3. Frank Drzymala's gas powered Luscombe

latter is most important.

More power to the twin cities' modelers!

At the head of our column a very unusual model is shown; in fact, it is very close to being a perfectly designed ship. From its appearance we estimate its stability is remarkable, for where the weight is high relative to the center of lateral area, great spiral stability results. This theory has been upheld in every case by the type shown in picture No. 1.

Paul Gambill built it because he had difficulties with some of his other models; consequently he decided to construct an amphibian. The result was this perfect flying job, weighing slightly over 3 lb., powered with an inverted engine. The booms holding the tail are just plain yardsticks put to good use. The rest of the ship is made of balsa covered with silk and doped.

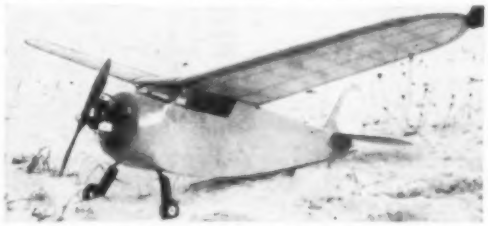
Picture No. 2 shows a very beautiful and unusual ship constructed by H. Seward Dion of 640 North Louise St., Glendale, Cal. Dion is employed by the Lockheed Aircraft Corp., and has taken many features for his model from Lockheed's ships; its similarity to the YP-38 can be noted. It is a twin engine job; one engine mounted in the nose of the center of the nacelle, the other at the rear. This is the most efficient way to arrange twin engines in any model, for if one stops the thrust still will be centered. Also the engine torque is balanced, allowing the model to fly torque-free. This greatly improves its stability.

In twin engine planes where engines are located one on either side of the longitudinal axis, both engines must run at the same speed in order to have the plane remain in flight. In such a case if one engine cuts out a spiral dive and crash usually results.

The plane in the picture has an 86-inch span and embodies such features as retractable landing gear of the tricycle type, landing flaps operated by hand before flight, miniature cannon and other interesting details. Originally the plane was powered by two Atoms, but upon testing it was found there was insufficient power, so one was replaced with an Ohlsson. This plane can carry two Ohlssons without difficulty. However it is suggested more dihedral be inserted in the wing, for, from appearance, this plane with only the slight dihedral employed will have a tendency to slide sideways and nose in on turns. If there is objection to increasing the dihedral then the fin area should be cut considerably.

Picture No. 3 shows how beautifully

(Continued on page 40)



Pict. 14. This scale Cessna has flown 8 min.

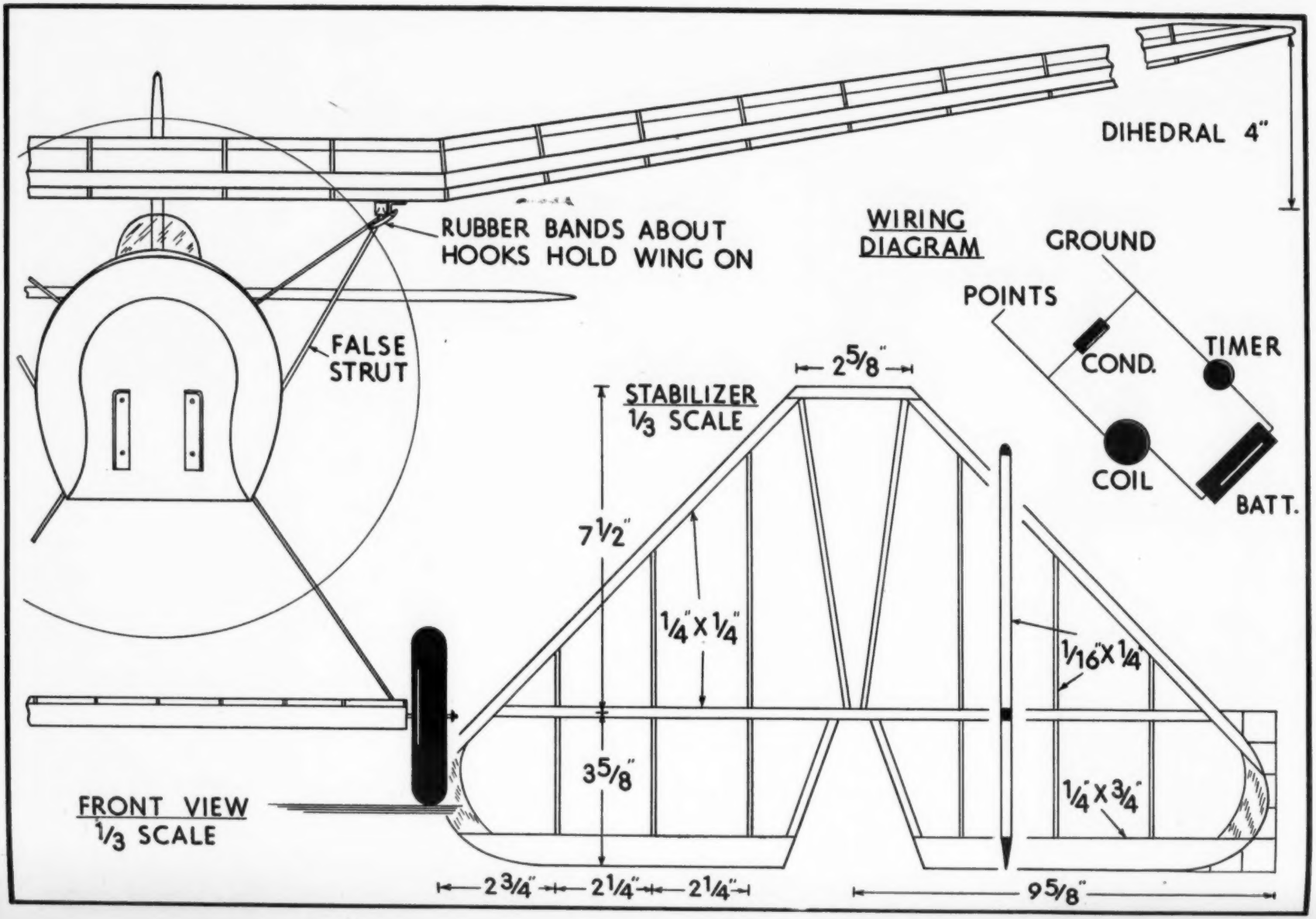
Pict. 13. Wm. Warner and his 10 foot radio controlled plane, Forster powered.

Pict. 11. McCormick and his biplane

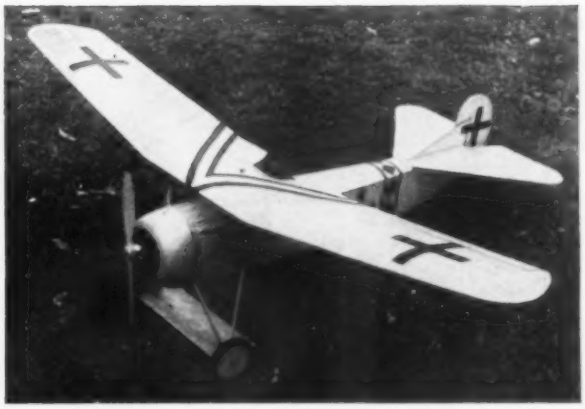
Pict. 12. Bristol and his super job

Pict. 9. The Bakersfield gas contest in full swing

Pict. 10. Henry DeBolt's "Blitzkrieg 23" takes off


DIHEDRAL 4"
RUBBER BANDS ABOUT HOOKS HOLD WING ON
FALSE STRUT
WIRING DIAGRAM
GROUND
POINTS
COND.
TIMER
COIL
BATT.
STABILIZER 1/3 SCALE
2 5/8"
7 1/2"
1/4" X 1/4"
1/16" X 1/4"
3 5/8"
1/4" X 3/4"
FRONT VIEW 1/3 SCALE
2 3/4"
2 1/4"
2 1/4"
9 5/8"

Square fuselage and tail surfaces are easy to build



The most realistic model you will ever build

FOKKER D-8 Flies Again

A Realistic Gas Model of a Famous Fighter That Performs Like a Contest Plane

PART 2

By

EARL STAHL

Its interesting details give fine appearance

IN THIS, the second and concluding part, plans and instructions for completing the flying scale Fokker D-8 are given. If you wish to begin construction of this realistic, fine flying model, we suggest you get a copy of last month's MODEL AIRPLANE NEWS and catch up with the job. For those who are ready to continue, the first step is to "scale-up" to actual size the various parts.

A steady exhibition or contest flier

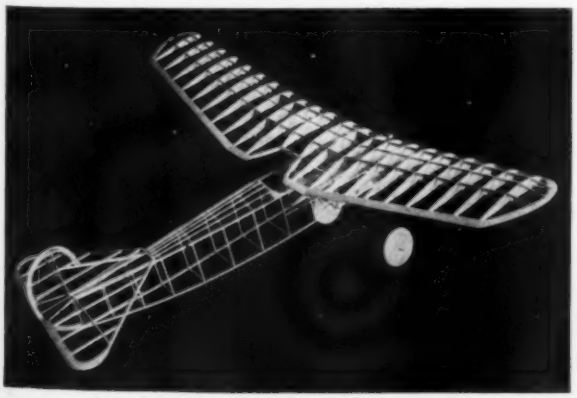
Wing

Begin constructing the wing by cutting the various ribs from 1/16" sheet balsa. Two of each type are required. Rib No. 1-B is identical to No. 1 except that the area between the spars is removed; No. 1-C has the trailing edge removed to extent indicated by the broken lines. Sand all ribs smooth and cut notches for spars —with the exception of the 1/8" square upper spar; all others are 1/8" x 1/4".

Assemble the wing in three parts: Two outer panels and center section. Taper the 1/4" x 3/4" trailing edge pieces and pin them over the plan. Use pins or brads to hold ribs in place and then attach the 1/4" square leading edge. Select hard 1/8" x 1/4" stock for the spars but only cement lower ones to place. The tip pieces are cut from 1/4" sheet. When assembling the center section, it will be necessary to cut the curved pieces, where the wing is cut away, from 1/4" sheet. The short piece extending beyond the 1-C ribs is 1/2" x 3/8".

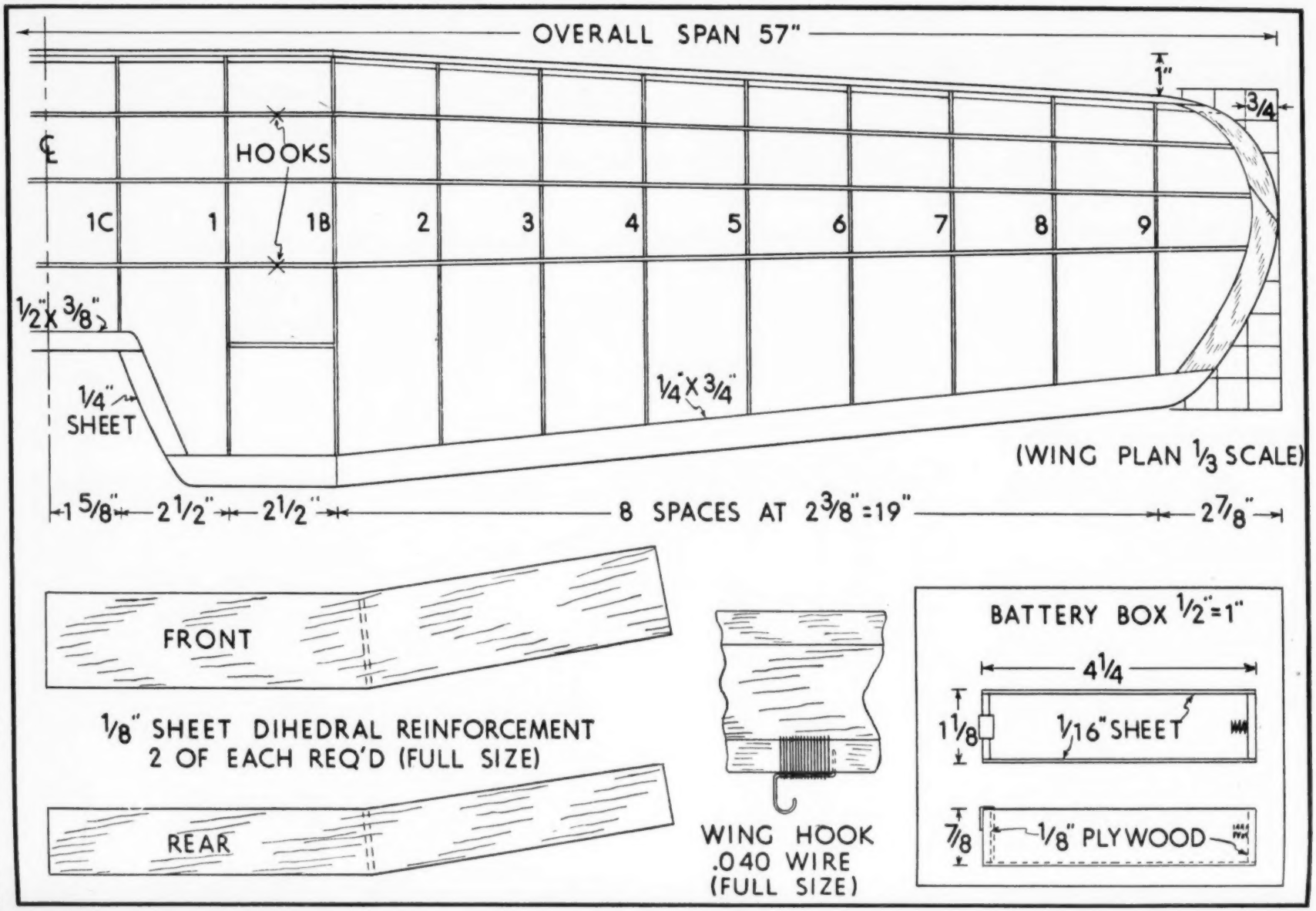
Before joining the three parts, the ends of the leading and trailing edges are cut to their exact length. Now pin the center section to the work bench or other level surface; then elevate the tips of the outer panels to the extent of 4". Accurately join the various members and cement

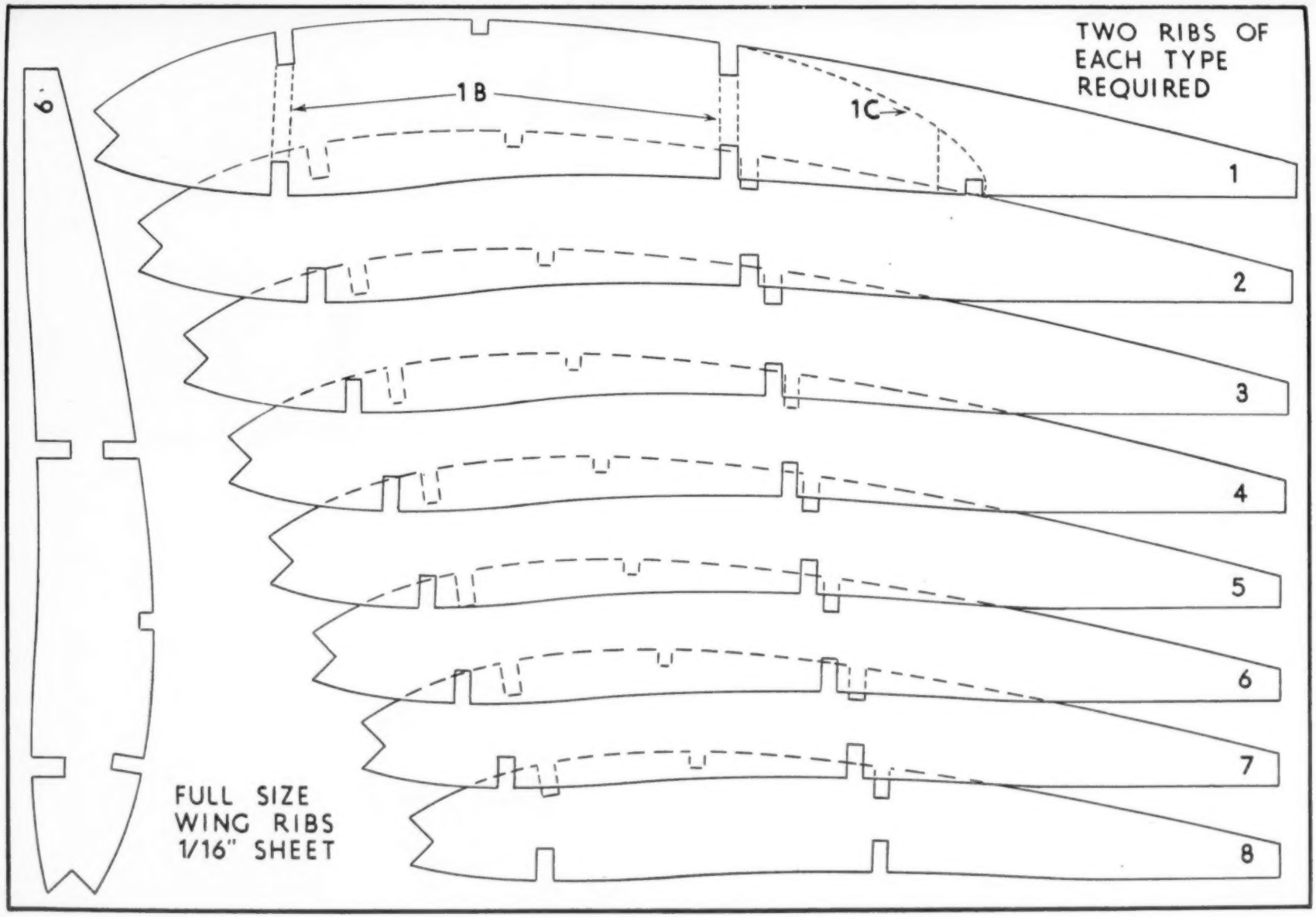
(Continued on page 38)



The frame is light and carefully designed

On the field it looks like the full scale plane


OVERALL SPAN 57"
1"
3/4
HOOKS
1C
1
1B
2
3
4
5
6
7
8
9
1/2" X 3/8"
1/4" SHEET
1/4" X 3/4"
(WING PLAN 1/3 SCALE)
1 5/8"
2 1/2"
2 1/2"
8 SPACES AT 2 3/8" = 19"
2 7/8"
FRONT
1/8" SHEET DIHEDRAL REINFORCEMENT
2 OF EACH REQ'D (FULL SIZE)
REAR
WING HOOK
.040 WIRE
(FULL SIZE)
BATTERY BOX 1/2" = 1"
4 1/4
1 1/8
1/16" SHEET
7/8
1/8" PLYWOOD


TWO RIBS OF EACH TYPE REQUIRED
1B
1C
9
1
2
3
4
5
6
7
8
FULL SIZE
WING RIBS
1/16" SHEET

The Snargasher, three-seat British trainer of modern design. Powered with two Gipsy 205 hp engines, its speed is 205 m.p.h.

FLASH-NEWS

Special To Model Airplane News

UNITED STATES ARMY AIR CORPS—President Roosevelt has asked for $289,065,000 additional appropriation for the Air Corps for the fiscal year starting July 1, 1941.

Northrop Aircraft Corporation has received an award from the Air Corps for $5,300,000 worth of military airplanes; bringing to a total of $31,387,968 the backlog of this company which started business only one year ago in Hawthorne (Los Angeles), California.

Charles A. Lindbergh, America's hero a decade ago and now a Colonel in the Air Corps Reserve has resigned his commission as a result of criticism from President Roosevelt. Thus does the Air Corps' Number One public figure fade from the scene. After making statements that "the United States cannot win this war for England, regardless of how much assistance we extend," and "Germany is almost certain to win" he was branded an appeaser similar to those who urged peace during the Revolutionary and Civil Wars.

The right for non-commissioned officers to pilot Army planes may soon be granted under proposed legislation recommended by the Senate military affairs committee. Long a practice of foreign air forces, this new move would permit enlisted men of the ages of 18 to 22 years with high school education including sufficient mathematics to study navigation, to take flight training as second pilots in the event of injury to the first officer of a bomber or attack plane.

(Continued on next page)

AIR YOUTH OF AMERICA

News of Importance to Modelers

TEXAS and the Southwest, always a "hotbed" of model airplane activity, are now taking the lead in developing a statewide program of Air Youth clubs. Through the generosity of one of Texas' leading citizens, Mr. H. R. Cullen of Houston, a fund has been made available by which Texas clubs wishing to participate in the national junior aviation program, related to America's growing aviation strength, may obtain assistance in training club leaders and setting up club activities. The announcement of Mr. Cullen's gift was made at a dinner, held in Houston early in May, attended by a group of well known citizens and leaders in model aviation.

Messrs. Gamache and Vhay, of Air Youth's staff, have been circulating through Houston, San Antonio, Dallas and other cities, conferring with local groups and laying plans for a "rapid fire" campaign to make citizens conscious of the importance of model aviation in youth training as well as aviation development. Ed. Burgdorf and George Haddaway have been actively cooperating in developing plans and interesting new groups in model aviation activities. If plans go along as expected, there will be an Air Youth club in the schools of every community in the state by next fall.

Mr. Hinckley Boosts Model Building

Good friend of model builders is Robert Hinckley, Assistant Secretary of Commerce, under whose direction has been developed the great civilian pilot training program sponsored by the government. Recently he spoke at a meeting of directors and friends of Air Youth. He took the occasion to stress the importance of a wide-spread program of junior aviation activities as essential to America's

(Continued on page 56)

Billy Halop, youthful star of the new screen serial, "Sky Raiders," takes the part of model builder and member of A.Y.A.

Pittsburgh, steel capital of the nation, underwent a blackout maneuver recently when Air Corps planes staged a mock attack on the city. "Lights out" followed the alarm and city and county policemen were on duty at their assigned stations. The maneuver, similar to a recent Seattle blackout, was pronounced a success.

There are now 1,185,600 officers and enlisted men in the U.S. Army.

Major-General Henry H. Arnold left New York by Clipper recently for London in company with Rear Admiral R. L. Ghormley and Brig. Gen. R. E. Lee to act as official military observers of the war scene. Aim is to increase effective cooperation between England and America in this war.

Recent Air Corps changes include moving the 34th Air Base Group from March Field, Calif., to Everett, Washington; the 43rd Air Base Group from Hamilton Field, Calif., to Portland, Oregon, and the 49th Air Base Group from March Field, Calif., to Fresno, Calif.

Douglas B-19 Department: News of this monster airplane seems to have attracted front-page attention everywhere and we give you here the latest: On its first movement into the open the 83 ton monster sank 18 inches into the runway at Douglas airport, Santa Monica. Its huge rudder stands 42 feet, 9 inches in the air. Its tail span is only 4 inches shorter than the standard Martin B-10 bomber wingspan! It can carry 125 fully armed men. It is able to fly 7750 miles non-stop! Named to test the monster early this month was Major Stanley Umstead, Army Air Corps and O. W. (Bill) Coyle, Douglas test pilot. On the ground for the first time when a new Douglas ship takes the air will be Major Carl Cover, vice-president and chief test pilot of the company.

The Air Corps needs 110,000 high school graduates or journeymen mechanics to aid in the maintenance work of the expanding Air Corps, it has been announced. The enlistment is for three years and the men will receive intensive mechanical training to serve as ground crews for new Air Corps flying equipment. It also needs 30,000 new flying recruits. Apply at your local Army recruiting station or U.S. Post Office.

The 804th Engineer Company Aviation (separate) has been transferred from Langley Field to Hawaii. Work consists of airport erection, maintenance and preparation of emergency landing fields.

Importance of the new Interceptor Command, which will fly the famed Lockheed P-38 twin-engine planes, was made public recently with the following appointments: Brig. Gen. W. A. Frank, Interceptor Command, Third Air Force, Tampa; Brig. Gen. J. C. McDonnell, Interceptor Command, First Air Force, Mitchell Field, New York; Brig. Gen. M. F. Harmon, Interceptor Command, Fourth Air Force, March Field; and Brig. Gen. C. H. Wash, Interceptor Command, Second Air Force, Fort Wright, Washington.

The Air Corps will build a $2,884,000 flying school at Albany, Georgia.

In the first test of air transport of large ground forces by the Air Corps, a detachment of infantry and officers was recently flown by air from Hickam Field, Honolulu to Burns Field on Kauai Island. The test proved that rapid reinforcement of outlying bases was possible.

Private James Stewart was recently assigned to the Air Corps replacement center at Moffett Field, California. So what? Well, this happens to be the James Stewart who won the Academy of Motion Picture Arts and Sciences "Oscar" Award as the most outstanding actor in 1940.

Flying Cadet E. L. Hastings, Jr., and Capt. D. N. Crickette were killed in the crash of their North American BT-14 training plane while leading a search for the crash of Technical Sergeant B. L. Williams' plane. Both planes and occupants were found in the rough country near New Braunfels, Texas.

A torrid half-hour was given Fort Leavenworth, Kansas, as a brand new Boeing B-17D 68,000 pound bomber circled the field attempting to land. The generator for the electrical supply to the radio and landing gear had failed and the crew pumped desperately for 25 minutes before the landing gear was lowered and plane landed safely. Since the radio was dead the ground crew could not warn of the landing gear's position.

NAVAL AVIATION—Captain William K. Harrill, now Commander of Patrol Wing One, has been assigned to new duties as commander of the aircraft carrier U.S.S. Ranger, Washington recently announced.

Ensigns Joseph C. Thompson and Paul C. Brown are awaiting court martial at Pensacola Naval Air Station in the horrible case of the decapitated mother of four children killed when the training plane the two men were flying swooped low over a field of workmen to "scare them." Commander W. D. Sample, executive officer of the station said: "They will be tried by a Navy court martial on the same charge and in the same manner as though it were a murder trial in a State court and their penalty will be just as severe." This is by far the worse case in the 35-year history of Naval aviation.

Ensign Perry Lee Teaff was uninjured in the miraculous landing of a stricken Curtiss SBC-3 dive-bomber when the landing gear refused to extend preparatory to a landing at Springfield, Mo., Airport. The ship skidded for 60 yards before it came to a halt right side up.

Chief Machinist Mate E. L. Parker, pilot and Seaman First Class B. W. Johnson were rescued after their Curtiss SOC-1 observation plane plunged into the ocean off Huntington Beach (Calif.) due to motor failure from a gas line stoppage.

Ten Navy men lost their lives in the terrific crash of a Consolidated PBY-1 giant patrol-bomber off Norfolk. The object of a search from land, sea and air, aided by the Goodyear blimp Resolute, the wreckage was found two miles off the coast. The plane's fuselage was not found and it is believed the bodies will never be recovered. The men were: Ensign Blackburn, pilot; Ensign Marson, Photographer Mueller, Mate Crowe, Radioman Sutto, Radioman Gurganus, Machinist Broadhurst, Ordnanceman McElrath, Seaman Taylor and Seaman Fasano.

The Navy's smallest blimp, the L-1, was damaged in a forced landing near a forest fire in Southern New Jersey. The blimp had been directing firemen in the area when its valves failed and helium escaped. Lieut. Henry F. Burfeind and a crew of three escaped injury.

Secretary of the Navy Frank Knox cracked down with his new Navy censorship campaign when he arrested Hugh C. Robbins, private flyer from Mineola, N.Y., for flying a photographer over the damaged battleship Malaya of the British Navy as it moved into New York harbor for repairs. Knox had directed that no photographs or publicity of any kind be given this movement of a British ship in an American harbor.

COMMERCIAL—Latest new ship is the North American XP-51, Air Corps version of the famed "laminar flow"-winged "Mustang" fighter for the British, described previously.

Curtiss-Wright now has three new experimental planes under construction. It is believed they are the same basic design in three different sizes.

Some totals: there are 33,000 airplanes now on order with manufacturers, 19,000 for the United States and 14,000 for the British. England originally placed fifteen billion dollars worth of contracts in this country but cut down to nine billion when it was shown that the industry of this country would be taxed beyond its strength. The National Defense Advisory Commission further pared these orders to seven billion, the figure at which it now stands. We have supplied one thousand airplanes to the British to date. This gives the British a one hundred percent reserve counting their own new deliveries.

Families of Pan American Airways employees are being evacuated from Hong Kong and Manila, it was recently reported; families of Army and Navy men in this area were also ordered home. Big things are thus anticipated in this Japanese-threatened area.

Douglas Aircraft now has a total of 26,295 employees at its three divisions and is moving towards a total of 55,000 when its Tulsa division commences production. It will deliver one hundred million dollars worth of airplanes this year from its total backlog of eight hundred million.

The first Easter Sunrise service to be conducted from the air was recorded when Rev. Bernard Clausen, pastor of the First Baptist Church of Pittsburgh, broadcast the service from a chartered Douglas transport which carried a 12-voice choir, an altar and an organ!

Pan American Airways Atlantic Clipper brought 31 persons to New York from Lisbon, the largest passenger list in its history. The last leg of the flight from Trinidad was made in 16 hours 50 minutes.

The Mexican War Ministry will place an order for 100 airplanes in this country shortly, probably for North American basic-combat machines.

Fifteen Brazilian officers headed by Captain Ary Presser Bello, arrived recently to take delivery of four new Lockheed 212 twin-engined attack-bombers.

Taking delivery on two new Grumman twin-engine amphibian photography planes, a Peruvian Mission headed by Captain Luis Conterno is now taking instructions in aerial photography at the

What Do You Think?

✦ From time to time many readers wish to discuss their problems with one another, but find it difficult to communicate with modelers in the thousands of distant communities.

Consequently, MODEL AIRPLANE NEWS is coming to their aid and is establishing this new column, "The Aero Forum." It will be dedicated to setting forth ideas, comments, criticisms (and answers to them) from readers. On particular questions where comments from the editor are requested they will be given; otherwise this space will be dedicated to "reader debates."

We look forward to having readers take advantage of this; sending material they wish to appear here. In doing so address your letters to: Aero Forum, MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City.

The AERO FORUM

ROBERT W. JENNY of 30 Chestnut Street, Rochelle Park, N.J., has some ideas concerning speed flying, which may be of interest and about which our readers may wish to comment. He writes:

Dear Sirs:

"I agree heartily with your opinions concerning model building, as expressed in the 'Gas Lines' of the March issue, and wish to extend you some ideas of my own.

"Speed flying could be done easily under general rules as follows:

1. Models tethered to a pole and flying in a circle.
2. Models designed and adjusted to fly in a circle below a set altitude and not exerting more than a given force (centrifugal) on the tethering cord (or wire, etc.).

"Definite standards could be set up. For example:

1. 50′ diameter circle.
2. 3 lbs. centrifugal force allowed.
3. 6′ altitude.
4. 3 laps warm up.
5. 3 laps timed for speed.
6. Unlimited conditions on size, weight, design, etc., within each engine class.
7. Take off run limited to one lap.
8. Model must land upright.

"These conditions are tough but certainly not impossible.

"Also, the flying machine of the future, if flying is to become more general, will be capable of vertical ascent and descent, hovering and flight in all directions—sideward, backward, etc. There is considerable room for brainwork on this type of machine—helicopter and autogyro.

"The most important restriction on this design must be the power loading. Many of the gas models in existence climb on the propeller alone. This would be possible with a helicopter and should not be allowed. At first further restrictions in vertical flight contests would be eliminated except for the provision that helicopters should be capable of autorotation in the event of engine failure and landing.

"I would like to hear from anyone and everyone on both these ideas. At present I am building a class C helicopter.

Signed, Robert W. Jenny."

Mr. Martin J. Delaney of Silver Creek, Pa., writes presenting his specifications of a super-cargo transport. Do you agree with the figures he gives? Are they consistent? What are your comments?

Dear Sirs:

"With reference to your article about readers' opinions on huge cargo transports, I believe I have an idea. My ideal would be about twice as big as the B-19 and a *300 m.p.h.* cruising speed.

"Wing loading—83 lbs. per sq. ft!

Davis Airfoil—Slots flaps.

Power plants—4 inline, 4000 hp. each; total 16,000 hp.

Landing speed—85 m.p.h.

Props—20 ft. diam. extended shaft. (Motor in wing flush.)

Range—100% (octane gasoline) 4,500 miles.

"*Structure details*: Retractable wing floats (hydraulic) and observation dome and possibly gun turrets (current), cantilever wing, tail assembly, prop shaft, all structures monocoque.

"I believe however that if any larger a flying wing would be much more efficient.

Signed, Martin J. Delaney."

San Diego Marine Flying Base. The latest type cameras are installed and the four army officers hope to pave the way for additional students to take instructions from the Navy and Marines. Captain Conterno stated that: "The Peruvian Air Corps is now the second largest in South America; planes are mostly of American manufacture."

On its 23rd anniversary, the Royal Air Force announced that it had shot down 4250 Nazi airplanes and 1100 Italian ships with a loss of only 1800 of their own.

In 1940, private flying in the United States flew 229,000,000 miles in 16,500 airplanes with only 231 fatal accidents in which 196 pilots, 138 passengers, 13 students and nine ground crew or third parties were killed. This average of 991,842 miles-per-fatality was attributed to the civilian pilot training program of the Civil Aeronautics Authority which has trained 4813 pilots accepted into the Army and Navy.

Teofilo Sison, Secretary of National Defense of the Philippines has urged "the creation of an air force sufficiently strong to command the respect of neighboring countries."

Vultee Aircraft now has a backlog of 97 million dollars with a payroll of 9,000 employees.

The new Timm Aeromold plastic low-wing training plane has received its air worthiness certificate and production will begin immediately. Fabricated of non-strategic material, the War Department has evinced a new and keen interest in this two-seat training ship.

In the face of strikes and wage disagreements throughout the country, it is interesting to note Douglas recently awarded a blanket wage increase of 5c per hour to all its employees. Thus two dollars more per week goes to the workmen, who belong to no union and have found no dispute with the fair-mindedness of President Donald W. Douglas.

The C.A.A. has requested $2,464,592 of government money to construct and improve 250 airports in California in connection with the National Defense training program.

So—Where Will You Fly?

(Continued from page 15)

for your club. Don't hesitate to go out of town an extra five miles; modelers will be more than glad to travel the extra mileage if they know they will find a better spot from which to fly their craft. Don't let their grumbling fool you; they're interested in keeping their models in one piece and out of harm's way.

So it is time to take stock of our situation. National defense activities are taking their toll of many former flying sites. And more air activity will mean than you may not be able to fly in the spot you're now accustomed. We're not trying to frighten you, believe us, but we do want you to look ahead.

Model clubs, service groups and model dealers interested in advancing aeromodeling for the benefits it brings to the individual should realize that model aviation is growing up, rapidly becoming "big potatoes." You can no longer conduct haphazard contests in half-size flying fields. It's gotta be done right; or it soon won't be done at all.

EDITOR'S NOTE: Apparently many model builders, like other people, do not know the difference between "liberty" and "license"; or at least, act as if they had no understanding of these two vital issues in America at the present time.

Many argue: "This is a free country, that gives us the right to do what we please." This is nothing more than license. Liberty brings with it the responsibility of the consideration of other people's liberties. One can be free only inasmuch as he does not trample upon the rights of others. When Americans as a whole, not only model builders, understand and practice this we will be a much better country to live in—and incidentally, farmers will not prevent model builders from flying at nearby airports.

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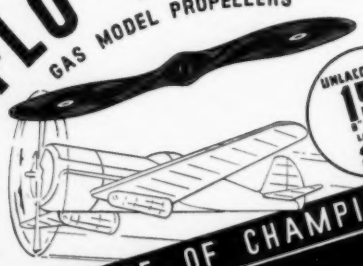

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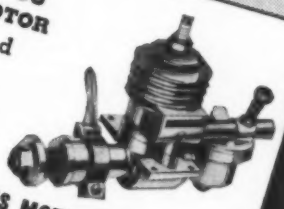

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The "Coronet" was designed specifically to meet the demand for a more efficient gas model in the small motor class. A proven contender in either class "A" or "B" it is unequalled in simplicity of construction and in low cost flight enjoyment. Consistent soaring ability incorporated with inherent stability assures you of peak performance in any A.M.A. contest. And it has a climb of 2,500 feet per minute! Complete kit, postpaid or at your dealer **$1.95**

★ **WINGSPAN**—46¼"
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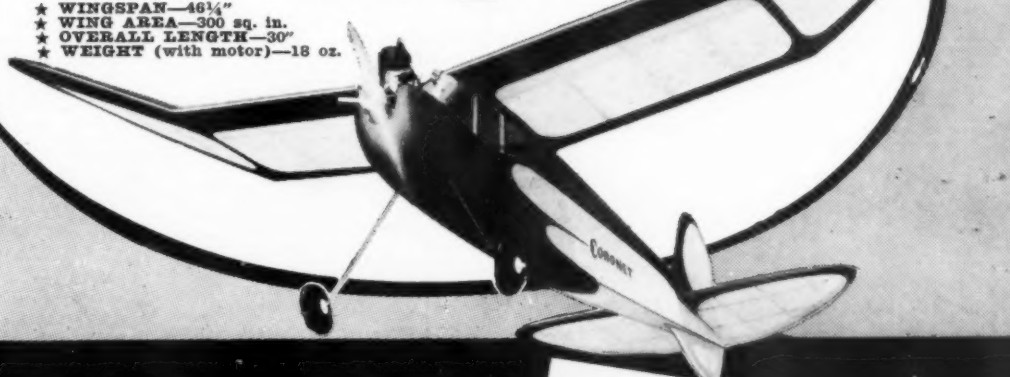
★ **OVERALL LENGTH**—30"
★ **WEIGHT** (with motor)—18 oz.



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Fokker D-8 Flies Again

(Continued from page 29)

thoroughly. Add upper spars and then cut dihedral reinforcements from very hard 1/8" sheet. Fit these accurately between the spars and ribs No. 1 and No. 2. The several parts of ribs 1-B are next cemented to place. Recement all joints for added strength. Cut and sand the leading edge and tips to final shape and go over the entire wing structure with fine sandpaper, to remove all roughness, so a neat covering job can be made.

Four wing hooks are bent to shape shown, from .040 wire. These are attached to the wing structure at a distance apart so they will fit snug against the outside of the wing rests. Hold hooks in place by sewing right through the dihedral reinforcement and then around the spars and hooks. Apply several coats of cement.

Tail Surfaces

Construction of the tail surfaces is so easy that very few instructions are required. The rudder plan is shown on the side view; enlarge both the stabilizer and rudder plan to full scale and assemble the parts directly over these plans. The rounded outlines of the rudder are cut from 1/4" sheet as are the stabilizer tips. Leading edges of each are 1/4" square and the ribs are 1/16" x 1/4" strips. Give all joints several applications of cement to help prevent warping and when dry, cut and sandpaper to finished shape.

Covering

Our model of the Fokker D-8 was covered with both silk and Silkspan. Silk is the finest covering material for gas planes because of its great strength, light weight and attractive appearance; the only drawback is cost. Because the fuselage is subject to so much punishment, we covered this part with silk; the wing and tail surfaces were covered with light Silkspan. Use thin cement for adhesive and cover the model in the conventional manner. When covering the undersurface of the wing, be careful to stick the covering to all of the spars and ribs to preserve the airfoil's shape. Shrink the covering with water and then apply one or two coats of clear dope.

The smaller details should be completed before the model is colored. As explained before, the cabane and landing gear struts are made streamline by strips of soft 1/16" x 3/16" balsa which are attached by spiral wrappings of tissue or silk strips. But before this is done, the four small hooks illustrated below the cabane strut details are soldered to the wing struts. The fourth strut on each side of the wing mount is a false strut, placed there for scale appearance only. Since this strut carries none of the stress, it should be made from soft 3/32" x 1/4" cut streamline and then lightly cemented to place. The wing mount without this strut is sufficiently sturdy yet it is also flexible enough to absorb more punishment without damage, than a rigid mount.

After the model has been flown for sometime it may be necessary to repair or replace these two struts, but that is certainly easier than repairing the whole mount or even the wing. Four small blocks are cemented to the pine wing-rests to keep the wing from sliding; use soft balsa so they will break off in the event of an accident and thus protect the wing from serious damage. Typical on all Fokker war planes was the small wing between the wheels. This can easily be reproduced but is not recommended when flying the model since it would probably "trip it" every time it lands.

Color of the model shown in the photos is flaming red-orange; this is especially striking with black trim. If possible spray the colored dope on to the covered surfaces; thin the dope and apply two coats. Decorations can be painted on, using masking tape for a neat job, or they can be cut from black tissue and doped to place. Paint tires, tail skid, inside of cowl, etc., black.

Now let's put the parts together to see how she looks. Wheels are held to place by washers soldered to the axles—place a washer at both sides of the wheels so they will turn freely. The stabilizer is cemented to place over the incidence strips and rudder is cemented on next. Off-set the rudder a bit so the model will glide to the right. Check and recheck for correct alignment.

Some builders may not like the idea of permanently attaching the tail surfaces and in this case it will be all right to make them removable, provided some method is devised to make adjustment secure. Bolt the engine mounts to the engine bulkhead with a 1/16" thick washer between the top of the mount and the bulkhead to give the engine the required amount of negative thrust. If a metal cowling is being used, it should be mounted, by small wood screws, to several small balsa blocks, which are cemented to the firewall. The engine unit is held to the fuselage by four small rubber bands wrapped about the hooks on the cowling and about the front wing and landing gear struts. Set the wing on the pine rests and secure its position by wrapping small rubber bands around the hooks.

Well, there she is—attractive isn't it?

Ignition

To install the ignition system it will be necessary to remove the engine unit. Details of the battery box for intermediate size cells are given. Use the finest grade stranded wire available for wiring, and solder all connections. Broken lines on the side view show the approximate position of the various parts. On the test ship the coil was attached by adhesive tape to a piece of balsa 1/8" x 1" x 3", cemented to the right side of the fuselage structure. The timer was mounted conveniently in the cockpit and the battery box was permanently attached to the left side of the fuselage just forward of the cockpit. Determine the batteries' correct position by changing them until the plane rests in a level position when held under the center wing spar. The condenser is attached to the engine mount. Now install fresh batteries and your Fokker D-8 is ready to fly.

Flying

First flight tests should be hand glides. Turn the propeller to horizontal and launch the plane at four or five feet of altitude. It should make a steady, smooth

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" 11"	weight Coil	Exhaust Stack
" 12"	Aero Super Coil	Hig Ten. Lead
" 13"	Firecracker Coil	Spring Clips
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glide to the ground but, in the event it stalls or glides too steeply, the batteries will have to be shifted.

Once your D-8 glides well, start the engine and make it run as slowly as possible without danger of stopping. Set the timer for 12 to 15 seconds and hand launch. Observe the flight carefully, making necessary corrections before the next trial. Make all adjustments to favor the glide and then off-set the thrust line to make the power flight as desired. Right or left thrust will control the amount of circle while under power and if it has a tendency to mush or stall, increase the negative thrust a slight amount. While it was unnecessary on the test model, a small aluminum tab can be attached to the rudder to help adjust the circles. Good luck to you!

Gas Lines

(Continued from page 27)

miniature gas engines can be applied to exact scale models. Here you see a 7-1/2 foot Luscombe "50", built by Frank Drzymala of 13 Quail Street, Albany, N.Y. It required a month to complete, working evenings.

Another interesting model, powered by two Atoms, is shown in picture No. 4. It has a wing spread of 42 in. and weighs only 16 oz., according to its builders, Bob and George Hemphill of Clemson, S.C., Box 104. The motors are mounted fore and aft on the centerline; thus the torque is balanced. George and Bob are members of the Columbia Aero Midgets. This type model should be successful, as well as very easy to construct.

In past issues modelers have read of Alan F. Kitchel's World War No. 1 plane collection. Picture No. 5 shows Mr. Kitchel with a few of his models. Though very small they have been made in careful detail.

Picture No. 6 shows one of them, a Handley Page. At most, the span is 6 in. and it required many hours to complete the fine details of wires and landing gear shown.

Plans for the old war-time Spad, prepared by Mr. Kitchel, will be presented in a future issue.

Picture No. 7 shows Miss Jeanette Eastman of New Rochelle, N.Y., with her Gruman Gulfhawk and the prizes it has won. Miss Eastman has established herself as the foremost "fair sex" scale model builder in the U.S.A. The little plane shown embodies details of the big ship to an amazing extent.

Picture No. 8 shows a 48-in. three wheel model, designed by Mr. Charles H. Grant and built by Sal Taibi. This little ship was built and test flown as a prototype for a radio control job; the objective was to have a perfectly stable model that would not be affected by rough weather. The results were very satisfactory; the ship was flown a number of times in a 25 m.p.h. wind and showed no signs of instability or crash tendencies.

It also showed excellent qualities as a contest model. Powered with a Bantam, and weighing 31 oz., it climbed at 45 degrees and attained a speed of about 60 m.p.h. (Note: Those who would like to see plans for this ship in MODEL AIRPLANE NEWS, please write the editor.)

The Bakersfield Gas Model Airplane Association held its third annual contest on April 6th. Clyde R. White, publicity chairman, of 1109 L Street, reports there were 396 planes entered; between 9,000 and 10,000 spectators. Flying was from 7 A.M. to 6 P.M. and modelers from San Francisco Bay district to the Mexican Border were on hand, some coming from as far east as Phoenix.

Picture No. 9 shows one corner of the flying field during the contest. The size and orderly aspect of the crowd is indeed awe-inspiring. Mr. White further writes:

"The meet was an open affair, with special trophies for the highest time in each class, a women's trophy and a junior trophy for entrants under 16 years of age.

"Here are the winners:

Chas. Koby, Van Nuys, 37:15.0.
Ray Acord, Hollywood, 37:14.0.
John Drobshoff, Fresno, 36:58.3.
J. O. Braun, San Diego, 35:29.5.
J. J. Williams, Los Angeles, 27:92.0.
Bob White, Pasadena, 27:02.0.
Wilfred Gardner, Venice, 19:21.0.
Vernon Buckner Burbank, 19:14.0.
Wm. H. Lain, Hollywood, 19:02.2.
Robert Polson, Vallejo, 18:59.0.

Class "C" Trophy: Chas. Koby, 37:15.0.

Class "B" Trophy: Wm. H. Lain, 19:02.2.

Class "A" Trophy: John Drobshoff, 36:58.3.

Women's Trophy: Betty M. Parsons, Glendale, 3:19.2.

Junior Trophy: Wilfred Gardner, Venice, 19:21.0.

"A 900 acre field was used and good thermal conditions enabled 22 ships to make flights of over ten minutes.

"For the most part, strict AMA rules were used. However, because of the great number of ships and the fact it was a one-day contest, only two flights were allowed. The best single flight determined the winner."

Harry G. Vogler of 1633 Duffield Street, Pittsburgh, Western Pa. State Contest Director, sends the following report of the Second Allegheny Mountain Area Model Competition:

"Easter Sunday saw a large group of contestants on the north end of the Pittsburgh-Butler Airport, despite the twenty-six mile wind, participating in the Second Allegheny Mountain Area Competition of 1941. The meet, sponsored by the Aero Club and Boys Club of Pittsburgh, had a large prize list and attracted many figures in model aviation circles, the most famous being William Good of radio control fame, who has been temporarily residing in Pittsburgh. Among the districts present were Cleveland, Ohio; Buffalo, N.Y.; Morgantown, W.Va.; Salem, Ohio and many other places throughout the area."

Picture No. 10 shows a dramatic moment at the field: Here you see Henry DeBolt's unusual ship, "Blitzkrieg 23," taking off from one of the runways. Mr. Vogler's report continues:

"Many crack-ups were among the casualties, due to the high wind, but the contestants' gameness was not hampered. Following are the respective prize winners:

Gas Powered: Open Unlimited: Paul Myers, Hollidaysburg, Pa.; John Hall, Meadville, Pa.; Milt Friedman, Pittsburgh; John Eberlee, Pittsburgh; Norman Delaney, East Liverpool, Ohio; Jos. Cassely,

Pittsburgh; Homer Doverspike, Pittsburgh; S. C. Caldwell, Salem; Dorry Hufman, Salem; Gail Paxson, Salem; Ken. Forsyth, Carmichaels, Pa.; Franklin Hall, Meadville; Robert Korn, Wheeling; Walt Keller, Cleveland; Earl Kinsey, Wheeling.

"Fuselage: R. O. G. Rubber powered: Edw. Gummell, Pittsburgh; John Harrington, Wheeling; Leonard Damratowski, Pittsburgh; William King, Pittsburgh; Robert Walker, Wheeling.

"Stick, H. L. Rubber powered: Owen Niehaus, Rochester, Pa.; Ray Caretti, Kitanning, Pa.; Robert Korn, Wheeling; Norbert Van Tuil, Stoneboro, Pa.; Justus Merkel, Monaco, Pa.

"Glider, H. L.: Edw. Gummell, Pittsburgh; Ron Ganserwicz, Pittsburgh; Francis Burkhardt, Pittsburgh; Phil Weatherwax, Pittsburgh; John Harrington, Wheeling.

"The new set-up of the field attracted much attention, and many comments on the manner in which the staff handled the entire affair were apparent. It is through such efforts that any gains in the interest in model aviation activities in the Golden Triangle is to be made."

Picture No. 11 shows F. W. McCormick of 1453 Belvedere Ave., Jacksonville, Fla., with the excellent biplane he entered at the Jacksonville contest. Its flying qualities were very unusual. The two wings are attached to the fuselage at the center, there being no interplane struts or wires.

In picture No. 12 you see our old friend, C. L. Bristol of the Cheyenne Gas Model Club. The club holds a contest every week and Mr. Bristol is one of the consistent winners.

William R. Warner of 1324 Hickory Street, Niles, Mich., sends us picture No. 13, showing him and his 10-ft. radio control sportplane of original design. The plane weighs 10 lb. fully equipped, powered with a Forster Super 99. Warner says: "The control unit is a knockdown of several models with a few of my own ideas added." He believes the outstanding feature is the automatic signal control: Whenever a maneuver is desired all that is necessary for the operator to do is push a button designated for this maneuver. The control mechanism will select the right signal and in turn transmit it to the ship, which is done in less than one second. So far the plane has proved very satisfactory and has made 18 successful flights. It is stable in the air and responds perfectly to controls.

Picture No. 14 shows a beautiful gas powered model of a Cessna, designed and constructed by J. Pettogross of 30 Clinton Avenue, Albany. The ship is 5 ft. 7 in. in span. In the picture it is shown equipped with a scale landing gear; however, for flying, it may be replaced by a shock absorbing landing gear. It also has removable cowling, wing and tail. The fuselage is covered with 1/16" sheet balsa, the wing and tail surfaces with bamboo paper. The complete weight is 2 lb. 8 oz. with a Phantom motor. So far it has made at least 20 flights, the longest about 8 minutes.

New Jersey

The spring gas meet sponsored by the South Jersey Gas Model Airplane Association, held at Pine Valley Airport, Berlin, N.J., was a huge success. There was a large

turnout of contestants and spectators at this AMA-sanctioned event. Respective winners in various events were:

Winner of $200 I.C.S. Scholarship for Highest Average Time of the day: Russell Scott, S. J. G.M.A.A. Laurel Springs, N.J.

Winner of Lord Elgin Watch for 2nd Highest Average Time of the day: Robert Griscom, 2909 Yorkship Road, Camden, N.J.

Winner of Club Trophy for largest number of entrants: Springfield (Pa.) Gas Model Club—33 Entries.

Flying Aces Trophy to Club winning the largest number of places: Capitol Aeroneers, Washington, D.C.

(Continued on page 67)

American Wings Over Britain

(Continued from page 9)

attack-bombers.

It is due to the thinness of the plates rather than its inherent lightness that it is said to be "as light as aluminum." For, as a matter of fact, ¾ inch aluminum alloy sheet heat-treated and casehardened would weigh almost as much as this heavy steel plate.

It must be borne in mind that armor plate is NOT intended to STOP bullets or shells, only to DEFLECT them! Therefore, armor plate is placed in the fuselage at a decided angle which, coupled with the acute angle of fire from the enemy airplane from above or below, gives a good 45° angle for deflection. There is no armor plate made for aircraft use which could STOP the 37 millimeter shell now being widely used. The penetrative power of a .50 caliber slug alone is enough to go completely THROUGH a ¾ inch steel sheet!

SELF-SEALING FUEL TANKS—A great deal of experimentation has been carried on in this country in the past year on self-sealing composite fuel bags. Martin, Firestone, Goodyear and particularly Vultee with their highly praised "Vulseal" fuel cells have all brought out successful answers to this problem. In general, these leak-proof tanks consist of an outer case of vulcanized, processed and moulded rubber, an inner seal of vulcanized rubber and an inner layer between these two of a particular substance different with each company. In the case of the Vulseal design, the inner layer is of a special macerated material which expands under the chemical action of raw gasoline. With the Martin design it is an inner layer of pure raw rubber which swells and seals the opening after the passage of the bullet has caused a seepage of gasoline. All of these tanks must be tested under actual service conditions to prove their worth. Actually, however, there is no defense against the 27 and 37 mm. shell ripping such a large hole in a fuel bag that it cannot be sealed through chemical action. Nor is there anything to prevent fuel bags from catching fire with .50 caliber tracer bullets. Nor is there a self-sealing tank which will close a .50 caliber bullet hole if the slug has "tumbled" as it entered or left the bag.

Main defense against these attacks on the warplanes fuel supply is the piping arrangement in which any one of the fuel bags may be shut off from the main supply at an instant's notice. There are six bags carried

in the fighting plane, 12 in the bomber. Each cell lies between a solid, stainless-steel fireproof rib bulkhead which will isolate any fire within a bag providing it does not catch the Alclad wing skin with its high percentage of magnesium!

The British system of interconnecting these fuel bags consists of mounting a tiny electric motor with rotary fuel pump within each bag, thus assuring a continuous supply of fuel under any circumstances.

SELF-SEALING OIL TANKS—Yes, the oil tanks, too, are of the leak-proof variety and are mounted in the upper portion of the power plant just forward of the firewall in such a manner that no immediate damage is done in the event of fire. However, the loss of the oil supply will seriously damage the engine and a forced landing will be inevitable. Their construction is identical to that of the fuel bags.

BULLET-PROOF GLASS—The British demand bullet-proof glass in the pilot's windshield. This takes the form of a rectangular plate of 1¼ inch glass bolted into the windshield and spaced about ½ inch behind the curved windshield panel and the electric gun-sight reflector panel. Once again, this sheet is only to DEFLECT bullets fired straight at the pilot!

RECOGNITION DEVICE—The renowned Very pistol with its Western style hand-grip and old-fashioned holster mounted on the lower right side of the pilot has gone the way of the external bomb rack and the fixed landing gear. Instead, they have developed a new type recognition device which is mounted within the power plant compartment with a blast tube firing vertically upwards. There is a single handle within the cockpit which will fire any one of six flares within the revolving chamber of the device. It will function automatically in either of two events, engine failure, or the removal of weight from the cockpit seat caused by the pilot slumping forward from wounds or by leaving the ship.

SEAT HARNESS—In addition to the conventional safety belt, the British require a seat harness which holds the pilot's shoulders back against the seat, his head against the headrest. This to prevent back and head injuries during the violent maneuvers demanded of a modern aerial "dogfight." The straps run from the top of the seat across the pilot's shoulders and down to a large triangular leather pad to which is attached the safety belt. The entire assembly may be released instantly by the pilot by pulling a handle on the left side of the seat which extracts the pins holding the safety belt and seat harness to the seat.

CONFIDENTIAL RADIO DETONATOR—This device we are not permitted to release other than to say that it is a small explosive charge placed within the Air Ministry radio transmitter and receiver which, as the ship strikes the ground in a crash landing automatically explodes and utterly destroys the confidential and restricted radio device now being used on British combat planes. This device is also used on the big Boeing B-17d's for the mysterious Norden Bomb sight. In the crashes of the three Boeing "Flying Fortresses" in this country in recent weeks, this device has functioned perfectly and the bomb sight has been utterly destroyed.

CAMOUFLAGE—All Royal Air Force

airplanes are completely camouflaged with browns, greens, and other dull hues.

INSIGNIA—One of the strangest lessons learned from the war has been that paint really weighs something! Yes, the addition of the red, white and blue insignia on the rudders of British fighting planes has added enough weight to the control surface to throw it completely out of dynamic, static and aerodynamic balance! Thus, modern British planes carry this insignia of their nationality on the vertical stabilizer or "fin." It consists of alternate vertical red, white and blue stripes with the red stripe placed forward and the blue stripe placed aft. Combat planes engaged in night fighting, bombing and night patrol duty carry an additional yellow ring around the circular cocardes on the wings to distinguish them from day fighting machines. This because white does not show at night, odd isn't it! But yellow will reflect the glare of searchlights or ground fires to such an extent that recognition of friendly Royal Air Force planes is made instantly.

COMBAT PLANES—What American manufacturers have taken advantage of these lessons from the war and are actually applying them? Well, as we have said ALL planes going to the Royal Air Force MUST have them, and here are a few of them:

Manufacturer	U.S. Type	R.A.F. Type	Comment
Bell	P-39	Caribou	Famed "Airacobra" (MODEL AIRPLANE NEWS, July, 1939)
Boeing	B-17B		"Flying Fortress"
Brewster	XF2A-2	Buffalo	Navy fighter (MODEL AIRPLANE NEWS, May, 1941)
Brewster	XSBA-1	Bermuda	Two-seat fighter-scout-bomber
Consolidated	PBY	Catalina	Navy patrol boat
Consolidated	31		"Davis Wing" flying boat (MODEL AIRPLANE NEWS, Sept., 1939)
Consolidated	XB-24	LIBERATOR	Four-motored heavy bomber (MODEL AIRPLANE NEWS, Sept., 1940)
Curtiss	SBC-3	Cleveland	Dive-bomber biplane
Curtiss	P-36	Mohawk	Famed "75" used in France
Curtiss	P-40A	Tomahawk	Allison-powered fighter (MODEL AIRPLANE NEWS, Feb., 1939)
Douglas	B-18A	Digby	Shark-nosed bomber
Douglas	DB-7	Boston	Light attack-bomber (MODEL AIRPLANE NEWS, Jan., 1940)
Douglas	A-17A	8A-5	Light attack-bomber (MODEL AIRPLANE NEWS, April, 1941)
Grumman	F4F-3	Martlet	Single-seat fighter (MODEL AIRPLANE NEWS, Dec., 1940)
Grumman	XF5F-1	Skyrocket	Twin-engine fighter (MODEL AIRPLANE NEWS, Aug., 1940)
Lockheed	P-38	Lightening	400 m.p.h. twin-engine fighter (MODEL AIRPLANE NEWS, May, 1939)
Lockheed	14	Hudson	Coastal Patrol bomber
Lockheed	Lodestar	Ventura	Larger model of the Hudson
Martin	PBM-2		Gull-wing bomber
Martin	167-B4	Maryland	Twin-engine attack-bomber
North American	NA-66	Harvard I	Trainer
North American	NA-55	Harvard II	All-metal version of NA-66
North American	NA-64	Yale	Trainer, fixed gear
North American	NA-73	Mustang	"Laiminar flow wing" fighter
Republic	XP-43	Lancer	Single-seat fighter (MODEL AIRPLANE NEWS, Feb., 1940)
Vultee	48C	Vanguard	Single-seat fighter (MODEL AIRPLANE NEWS, May, 1940)
Vought-Sikorsky	SB2U-2	Chesapeake	Two-seat dive-bomber

For complete details concerning these ships refer to the issues of MODEL AIRPLANE NEWS referenced for each ship above. This will give you a graphic portrait of the ships themselves as they were originally designed for the Army Air Corps and Naval Aviation. Add to these notes the information contained herein and you will have the complete story of "Warplanes For Britain!"

A Miniature Flying Stinson O-49

(Continued from page 17)

flying scale contest model. In appearance it is attractive yet not difficult to build. Best of all, the aerodynamic proportions are near perfect; our test model was built to scale and it was unnecessary to even increase the wing's dihedral or enlarge the proportions of the tail surfaces to obtain long, stable flights. The relatively long fuselage permits use of a powerful motor of considerable length, thus increasing the length of power flights. To make possible use of a propeller of sufficient size the landing gear is shown in the extended or flight position. In addition to its excellent flight qualities, the Stinson offers a wealth of detail to be reproduced in the radial motor, cabin windows, etc., for those who seek maximum "scale" points in flying scale contests.

Fuselage

The fuselage underframe is constructed first; it is shown lightly shaded on the plan. Work directly over the plan and make two side frames; longerons and uprights are 3/32" square balsa. While the curvature of the lower longerons is not

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J22. VOUGHT-SIKORSKY XF4U - 1—A shipboard fighting plane with inverted gull-wing for lower center of gravity, better wing-to-fuselage streamlining and carrier-deck landing. 30-inch wing span 50c

J23. LOCKHEED INTERCEPTOR—Called "Lightning" by the British, the 2,200 H.P. original of this model is about to make history in warfare. A most novel design. 30-inch wing span..... 50c

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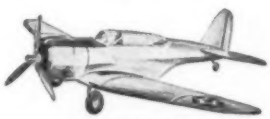
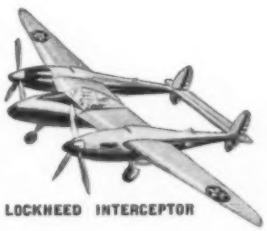


DOUGLAS 8A5



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excessive, it is advisable to steam them to shape so they will not have a tendency to draw the upper longerons out of alignment when removed from their jig. When dry, the side frames are joined by 3/32" square cross-pieces. Check frequently to assure proper alignment of the entire structure.

With exception of the cabin formers, the fuselage formers are cut from soft grade 1/16" sheet balsa. It will be noticed that some of the formers lack notches for the stringers, and where this is the case the stringers are attached directly to the sides, as shown. Cement formers to their respective positions and then add the 1/16" square stringers. The stringers that extend along the sides are cemented directly to the underframe.

Because of the cabin's unusual shape, special care must be exercised to insure accuracy and strength. Full size cabin formers are shown and they are made from hard grade 1/16" sheet. Assemble the parts of formers C-1 and C-4 directly over the plan—they must be exact. Looking at the side view of the fuselage, it will be noticed that C-1 is attached at an angle to the top longeron. Cut a cardboard pattern to exact angle, to aid in accurately attaching the front member to place. Cement C-1 and C-4 to place and then cut two ribs to shape indicated on the side view; assemble them to the notches in the formers. If you have reproduced the structure with greatest care, the ribs will have the correct incidence—2-1/2 degrees positive. Attach the other formers and the 3/32" square pieces that form the cabin. Thoroughly recement all joints.

To effectively represent the metal nose of the real ship, the front from section No. 1 to No. 2 is covered with soft 1/32" sheet. Two 1/8" sheet balsa discs are cemented to the front of section No. 1 and then shaped as indicated. The engine cowling is made in a similar manner. A frame consisting of two circular bulkheads and four 1/16" square spacers is assembled as indicated by the broken lines; this structure is covered with 1/32" sheet. The rounded nose section is made from laminations of 1/8" sheet, the centers of these discs being removed to the extent indicated by broken lines. Details of the nose plug are indicated. The removable section is made to fit accurately to the crank case which is cemented within the cowl front. Finish the nose and cowl by sanding to finished shape but do not cement the cowl to the nose until later.

Landing Gear

Before constructing the landing gear full size sketches of the various wire parts are made; these parts are bent from .034 music wire. With needle and thread sew the top member of the front unit to the fuselage longerons and cross-member. Since the nose is covered with sheet balsa, long nose pliers will probably prove helpful for working the needle about the wire and through the formers. The other two wire units can be temporarily held to place until the parts are accurately fitted and the whole structure properly aligned. Neatly but firmly solder the struts together. Securely bind the rear struts to the lower fuselage stringer, then reinforce the area with 1/16" sheet, as shown. The center strut is not attached to the fuselage, it being left free to twist and spring and thus absorb shock. The balsa and rubber tubing fairings are not attached to the landing gear until later.

Wheels are made from laminated balsa discs or they may be purchased. Bearings should be cemented to the sides so they will revolve smoothly and accurately.

Wing

Because of limited space a full size wing plan could not be reproduced, so a full scale layout should be made on a large sheet of paper and work done directly over it. Taper and sand the trailing edges before pinning them into position over the plan. Ribs are cut from light grade 1/20" or 1/16" sheet; sixteen regular and two tip ribs are required. Pin ribs to position and then attach the leading edges and spars. Assemble tip pieces, which are cut from 1/8" sheet, and cement them to place. Once the leading edges and tips are trimmed and sanded to shape the wing frames are completed.

Tail Surfaces

Construction of the tail surfaces is quite simple. Both rudder and stabilizer are made similarly, the plans being nearly self-explanatory. Make the stabilizer in one piece. The streamline rib shape is made by gluing 1/16" square strips of a soft variety to both sides of the underframe and later cutting them to shape. This manner of construction is strong yet light. Carefully trim and sand the parts so a smooth covering job can be made.

Propeller

Carve the propeller from a very hard balsa block 8" x 1-1/2" x 1"; lay out the blank as shown. Always cut the back face of the blades first. The hardness of the wood will determine the thickness of the blades, its shape can be seen on the photos. Thoroughly sand the propeller and then apply several coats of clear dope with light sanding between each coat to produce a nice smooth finish. Equip the prop with some kind of free-wheel device so the glide will be improved.

The propeller shaft is bent from .040 music wire. Place several washers between the prop and nose plug and bend a loop on the front of the shaft into which a mechanical winder can be hooked.

Covering and Assembly

Before starting to cover your Stinson the entire frame should be lightly but thoroughly sanded to remove all roughness. The several flat windows between sections C-1 and C-4 are covered with cellophane at this time—other windows are celluloid and not added till later. Being an Army plane, standard blue and yellow colors are used. Use banana oil for adhesive and cover the fuselage with blue tissue; to prevent wrinkles numerous small pieces of tissue should be used. The sheet-balsa-covered nose and cowl are tissue covered, too. Wings and tail surfaces are covered with yellow tissue; grain runs spanwise. Tips, etc., require separate pieces. The parts are lightly sprayed with water to tighten the tissue but are not doped until the ship has been assembled.

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To assemble your O-49 follow this procedure: Finish the cabin windows first. Use the very lightest celluloid available—film negatives boiled in water to remove the emulsion are excellent. Start at the back and make accurate paper patterns of each section, cut the celluloid to shape and cement to place, being careful to avoid cement smears. Pattern for the front windshield is given but it may need slight altering to exactly fit your model. Thin strips of tissue doped to the windows, as pictured, will improve its appearance.

Finish the landing gear by cutting the balsa covers from 1/8" x 1/2" soft balsa; these members are streamline in cross section. Cut 1/16" deep grooves in the struts to hide the wires and cement the wires fast; do not, however, attach the tops of the struts to the fuselage. Cover the struts with several layers of colored tissue. Split the rubber tubing, slip on the rear struts and then recement. Wheels are colored and held to place by washers soldered to the axles. It will be necessary to temporarily cut the tail post to admit the stabilizer, which is attached by cement at the angle shown. The rudder is offset 1/16" so the model will glide in right circles. The wings are fitted to the fuselage with tips elevated 1-1/2"—scale dihedral. The "vee" wing struts are shown half size on the plans; they are 3/32" x 3/16" balsa cut streamline. Struts join the wings at the "X." If the builder wishes to add engine details within the cowling it is best done before the unit is cemented to the nose. Now that the model is assembled, a coat of clear dope is applied to all the covered surfaces.

Minor details are usually the features that make the model really attractive. The O-49, an Army ship, of course should have the regular wing stars and rudder stripes. These can be made from colored tissue as can the "U. S. ARMY" on the wing's under-surface. Control surface outlines, flaps and slots, etc., are represented by thin strips of black tissue. As noted before, engine details within the cowling will go a long way in adding to the ship's attractiveness. Naturally the propeller and other exposed wood parts are color doped.

About ten strands of 1/8" brown rubber are required to power this model. Measure the strands to the correct length and attach them to the prop shaft loop. Drop the rubber into the fuselage and slip the bamboo pin into place to attach the rubber in the rear. Your model of the Stinson O-49 is now ready for its first flights.

Flying

Select a calm day and a grassy field for the test flights. However, before taking the ship to the flying field, it should be made to balance by adding weight to the nose or tail, until it rests on an even keel when held at the center of the wing's chord. Test glide the plane and readjust the weight, as necessary, to obtain a nice smooth glide. Once the glide is satisfactory, try short power flights and if any corrections are required, make them by offsetting the thrust line. A sliver of wood at the top of the nose plug tilting the thrust line down at a slight angle will probably "iron out" a stall, while right or left thrust will adjust the circle during the power flight. While under power, circles should be large and to the left; in the glide it should turn to the right. A little effort and caution will reward you with a fine plane which is truly attractive yet a remarkable flyer.

Happy Landings!

Dive-Bomber De Luxe

(Continued from page 15)

facts concerning the Junkers, the ship had to have a top speed of at least 350 miles per hour, disposable load of at least 2200 pounds and range of at least 800 miles, together with greater armament and fire power.

After examining proposal sketches and drawings of the seven companies which submitted bids, the Curtiss ship was selected by the Design Board; detailed design and construction was begun early last year. The resultant ship, THE CURTISS XSB2C-1 DIVE-BOMBER, IS OUR PLANE-ON-THE-COVER THIS MONTH!

As are all Curtiss machines, the XSB2C-1 is a strange yet oddly practical-looking airplane. Curtiss airplanes are built first for utility and practicality, second for speed, performance and tactical efficiency. And perhaps this secret has been the best way to build military airplanes, for the Curtiss-Wright Corporation is the world's largest aviation organization. And it is, by far, the oldest having grown directly out of the old Curtiss concern at Hammondsport when the first seaplane was completed. This dive-bomber is of conventional layout with one exception—its odd-looking rudder and its high placement. But this, too, has a practical reason d'existance, for it leaves the fuselage's lower rear part open for installation of the carrier-deck landing hook.

Basically it is an all-metal monoplane single-engine two-seater with retractable landing gear and folding wings. The propeller is completely covered with a huge metal spinner which sheathes the pitch-changing mechanism of the Curtiss electrically controllable-pitch propeller. This is a three-bladed all-metal design of constant-speed design and is full-feathering.

Power is supplied by an 18-cylinder Wright Double Cyclone twin-row radial air-cooled engine developing 1700 horsepower for take-off at sea-level, 1250 maximum power at 8,500 feet and 1100 horsepower for cruising at 14,600 feet. This huge engine, largest air-cooled radial engine in the world, has a cubic volumetric displacement of 2616 cubic inches, a compression ratio of 6.85 to 1 and is supercharged with a blower ratio of 7.14 to 1 in the first stage and 10 to 1 in the second stage. Air is taken from the slipstream through a small duct located atop the engine cowl on its front face, routed to the rear, down into the carburetor located on the rear of the engine.

The oil cooler is located in the bottom of the power plant compartment, cooling air being taken in through a retractable scoop located on the bottom of the engine

cowl. When warming up the engine on the ground or during high, fast climbs this scoop is lowered and routed through the oil cooler, which is of the cylindrical core type, the oil is thus cooled. In low temperatures or during cruising the scoop is closed and the oil is cooled by the simple expedient of routing it through the system, which consists of a large spot-welded tank located atop the power plant compartment, secured through quick-detachable tank pads and support straps to the upper engine mount bearers. From here it is rounted directly into the engine, pumped out by built-in scavenging pumps through a filter unit. through the cooler and back into the tank's top. A small hopper is built into the tank throat outlet to serve as accelerated warm-up compartment, preheating the oil before delivering it to the cold motor.

The fuel system consists of two wing tanks located in the inner panel on each side of the fuselage. The right tank has a reserve supply maintained through use of a standpipe which only allows the standard capacity to drain out during normal flight operation. In emergency the standpipe is closed and the reserve supply is reached through the outlet on the bottom of the tank.

Fuel is delivered to the huge engine through use of an engine-driven fuel pump and a special Navy version of the Air Corps' type D-4 fuel unit which combines a strainer, pressure regulator and relief valve into one single unit, thus eliminating complications of three separate units.

The fuselage is constructed of conventional frames, stringers and skin plating. There are sixteen pressed flange bulkheads, three of them solid, spaced twenty-three inches apart within the fuselage. These are connected with "Z" section extruded stringers. Over this is attached the 24 STAL Alclad skin sheeting which is attached to the framework with flush riveting, the Curtiss standard 110° counter-sunk design which the company makes itself.

The engine is supported on a welded-steel tubing engine mount anchored at four points to the firewall of corrosion resistant stainless steel sheet. The engine's mount is bolted to the four points of attachment as well as to the eight points of attachment to the motor, at which points the engine is supported on heavy rubber anti-vibration bushings.

The cowl is the fully-enclosed type, equipped with cowl flaps along its upper rear hemisphere, hydraulically controlled from the cockpit. These work in unison with the retractable oil cooler scoop and are used to keep the engine cooled under the same conditions as the oil is cooled. There is a 1-1/4" inch vent duct around the circumference of the fuselage 22 inches aft of the engine cowl's rear edge, to vent air from the powerplant compartment.

The battery is mounted within this powerplant compartment and is the 24-volt six cell variety. It is equipped with both a drain line, which runs aft and out of the fuselage aft of the rear cockpit, and a vent line which takes air out of the inside of the engine cowl and carries the battery fumes to the rear through the drain

line. The entire left side of the compartment is painted with Navy black anti-corrosion pigment to prevent damage to lines, fittings, connections or the fire-wall through spilling of battery acid during violent maneuvers.

The engine exhaust system is made up in five major parts with manifolds exiting at the rear on the outside of the fuselage. Two large, streamlined fairings envelope the exhaust terminals and thus route the exhaust down and out under the wing. The two-stage supercharger exhaust is routed into the main exhaust system. The cockpit heating system consists of a muff assembly clamped around the exhaust, thus heating the cold air taken into the ship through a wing duct and providing either cold or hot air, or desired mixture of the two, into the cockpit.

The wing is of all metal design built up on a structure of two main spars and an intercostal or auxiliary spar near the trailing edge. Spars are built up of a single flat sheet solid web with extruded section cap-strip supports and milled aluminum alloy cap strips. This structure is reinforced by vertical and angular extruded section stiffeners riveted along the web at point of high stress concentrations. The spars are broken at a point one-third the way out to provide a folding status to the wing. The wings are folded through hydraulic action and locked in the up or folded position with small auxiliary struts attached from the outside between the wing-tip and the fuselage. The wings are straightened and locked through hydraulic action necessitating that the engine be running during the action, thus giving the ship a strange appearance on the deck of the carrier, with engine running and pilot ready for flight with the wings folded over his head.

The ribs are of hydro-pressed flanged sheet metal cut and stamped in the process. They are built in three pieces, the two spars and intercostal serving as breaks. The nose ribs are the one-third cut type and run only to front spar. The folding portion of the wing has no nose ribs, the leading edge being taken up with automatic slots which open when the ship reaches a predetermined angle of attack two degrees above stalling point. This permits air to rush into the opening and over the wings, restoring lift and trim.

The wing flaps are the trailing edge type, hydraulically operated through a single operating arm projecting above the mold line on the upper surface. They are all-metal construction and the skin plating is of the corrugated pattern increasing strength and rigidity. The ailerons are all metal design but fabric covered to prevent flutter and are equipped with trimming tabs controllable from the cockpit.

The wing-tips are of the upsweep type lending even greater stability in prolonged dives.

The tail surfaces are all metal full cantilever design in the stabilizers. These are built up on a structure of ribs, a single spar at the trailing edge; the entire structure is flush riveted. The rudder and elevators are fabric covered, equipped with trimming tabs controllable from the cockpit. Control of flight surfaces is by cable throughout. The tail surfaces are completely equipped with identification and navigation lights and in addition the rudder is equipped with special bomb signal light to notify trailing members of the formation that it is releasing its bomb load.

The pilot sits high and well forward in the fuselage just over the leading edge of the wing. His vision above, forward and to the sides is enhanced by addition of glass panels in the inter-cockpit structure behind him. The sliding glass enclosed hatch above his head is extremely large and reaches nearly to his waist when he is in the cockpit, aiding vision downward.

The observer-radio operator-rear gunner is located far aft in the ship to compensate the weight and balance design for the extremely heavy engine. He is well enclosed by an ample sliding hatch which has a variety of special openings and sliding sections within itself. The entire structure moves forward and a portion of the upper aft fuselage folds into the fuselage structure exposing the rear gun and making the rear gunner ready for battle.

The bomb bay of the Curtiss XSB2C-1 is located in the ship's belly between the wing's leading and trailing edges and is completely covered by two hinging bomb doors, hydraulically operated and controlled from the cockpit. The bombers are mounted in pairs with a total of eight 150-pound types carried horizontally in order to make them move out vertically when in bomb-diving attitude. They are ejected forcefully through secret spring loaded mechanisms, a feature which German Stukas do not have and lack of which has caused many mid-air explosions during operations in France and Poland.

Armament aboard the dive-bomber includes two forward-firing .50 caliber Model M-50 electrically controlled machine-guns, firing through tunnels in the upper cowl and ejecting through two large streamlined housings in the upper cowling. A total of 500 rounds of fifty caliber ammunition is carried for the nose guns which are synchronized with the propeller through an electrically controlled impulse generator geared to the propeller and controlled by the pilot. This generator operates the guns' trigger motors; the mechanism is capable of firing 1200 rounds per minute.

The rear gunner handles a single free-firing .50 caliber weapon, the first such design used in this country in a rear gunner's implacement. He has a total of 1500 rounds of ammunition contained in ten individual cannisters mounted underneath the fuselage rear cowling.

The landing gear of the Curtiss XSB2C-1 is the fully retractable type, folding upward and inward towards the center of the ship into the wing wells provided. The entire structure is covered with large metal plates which effectively close the opening and provide a smooth flow of air over the wing. The landing gear is the triangle braced pneudraulic design and carries smooth contour Navy type tires.

The tail wheel is also fully retractable,

moving in unison with the main landing gear. A solid-type Navy tire is used on the tail wheel.

The tail wheel is so arranged that in retracted position it is not exposed to the airstream, thus requires no closing doors. The carrier deck hook moves out of the rear of the fuselage and hangs down to contact the ropes stretched across the deck of the carrier. It retracts and extends though hydraulic action.

The pilot is equipped with combination gun and bomb sight in the manner of a pursuit plane, which merely points the nose of the ship at the enemy. The instrument panel is located low and underneath the fuselage's upper edge, which is heavily padded to protect the pilot from injury. The power control panel is located on the lower left side of the fuselage and the armament control panel on the right. The throttle, mixture control and propeller control handle are all located within the throttle quadrant on the upper left side of the cockpit. Immediately below this are oil cooler scoop and cowling cooling flaps control gears.

The armament control panels include selector switch for guns as well as bomb selector switch which releases the bombs either individually, in pairs or in salvo. The bomb door control gear is located on the side of the armament control panel and moves downward to open the doors, upwards to close them. The electrical switch panel is located on the lower left side of the instrument panel and includes every possible navigation, flight and engine instrument necessary to the high grade piloting expected of Naval personnel on bomb diving missions.

The radio operator is equipped with complete Command Set transmitting and receiving sets, as well as marker beacon receiver and directional loop mounted within the structure between the two cockpits. He sits on a special swivel seat which faces forward, to the rear or folds completely out of sight.

The Curtiss XSB2C-1 has a wing span of 38 feet 7-1/2 inches and is 30 feet 4 inches long. It stands 11 feet 1 inch high in the three point position.

It has a gross weight load of 8260 pounds, which includes a bomb load of 1200 pounds, crew weight of 400 pounds and empty weight of 6660 pounds. It has a total fuel capacity of 146 gallons including a reserve supply of 32 gallons. The oil capacity is 12 gallons with foaming space provided.

The top speed of the Curtiss XSB2C-1 is 358 miles per hour; it cruises at 326 miles per hour with full military load. It has a cruising range of 960 miles and duration of 4-1/2 hours, the first at cruising r.p.m., the second with reduced loading and no military equipment.

Service ceiling is 24,400 feet and absolute ceiling is 25,800 feet. It climbs 2990 feet per minute initially and can climb to 15,000 feet in 8-1/2 minutes.

The United States Navy has just awarded a contract to the Curtiss-Wright Corporation in the amount of $52,468,900 for 1260 Curtiss XSB2C-1 dive-bombers. These will be built in the new Curtiss-Wright factory at Columbus, Ohio, which employs 12,000 workmen at top production.

Thus, almost a decade after the invention of a powerful new aerial weapon, the United States has at last awarded a contract to build a new one based on a German copy of a dive-bomber by the SAME COMPANY which originally designed the type. But perhaps the lessons the Nazi have gained and the terrific price they have had to pay to learn them, and the lessons we have thus stolen from them at no cost to ourselves; perhaps then this is the American way of doing business. We've got a better product than any in the world, it has been type-tested in the worst war in history, and we risked not a single man in that test! We wonder then if the American's way of dreaming things up, letting somebody else break his neck to find out if it works, and then going into our own production on an improved version isn't doggone smart!

The Physics of the Airplane

(Continued from page 25)

air caused by heating of the atmosphere. Trade winds, experienced a few degrees north and south of the equator, blow in the same direction for extended periods of time and owe their origin to atmospheric heating in the vicinity of the equator. Heated air rises in warm thermal currents in the vicinity of the equator, while colder air from regions north and south of the equator flows to displace the warmer air (take its place). These winds consequently tend to blow from the north toward the equator in the northern hemisphere, and from the south toward the equator in the southern hemisphere. However, because of the earth's rotation and the unevenness of the terrain these winds are definitely deflected from their normal course.

2. When heat is transferred from one part of a body to another without any progressive motion of the parts, it is caused by a phenomenon defined as conduction. This phenomenon can easily be tested by inserting a metal rod in a hot fire. Heat will travel along the rod until the member eventually becomes too hot to handle; this internal heat transfer is another point to consider in airplane engine design when cooling is considered.

3. Lastly, heat is transferred by radiation, which is defined as the movement of heat from one place to another by means of heat waves in the "ether." Radiation equipment known as radiators of liquid cooled aircraft engines adequately demonstrates this principle. The student of aeronautics has probably noticed the construction of the coolers on liquid cooled engines, and found that they are constructed with very large cooling areas. This is necessary because the amount of heat radiated from a surface increases with the area of the radiating surface.

Liquid cooled engines are known as indirect-cooled engines, while air cooled engines are known as direct-cooled engines. See Fig. 1 for a typical liquid cooled radiating system of an army airplane. In the former, the heat of combustion is transferred by conduction through cylinder walls and distributed throughout the water through convection. The heated water travels to the radiator where it is exposed to the blast of the slipstream and dissipated by radiation. Note that all three types of heat transferences are necessary to cool an indirectly-cooled engine. In a direct-cooled engine, the major part of the heat is dissipated by conduction from the inner walls of the cylinder to the extremities of the flanged cooling fins on the cylinder sleeve and head. From the cooling fins, the heat is radiated directly to the atmosphere.

Once again we refer to the previously discussed aluminum cylinder heads. In addition to light weight and desirable expansion characteristics, they are further qualified by their property of high thermal conductivity which permits them to radiate rapidly to the atmosphere some of the terrific heat developed in the combustion chamber. Conduction and radiation of air cooled engines is one of the most important functions in their operation. The cooling fins must be chamfered to a thin edge and the area must be sufficient to cool the engine adequately while idling on the ground on a warm day, yet not excessive so as to cause extreme cooling in flight.

As intimated, all materials regardless of their state tend to expand with applied heat. Gases or substances existing in a volatile state or having a high volatility characteristic are no exception to this general law. All forms of existing aircraft engines are of the internal combustion type (either spark-ignition or Diesel) and rely on the principle that heat energy is converted into mechanical energy when heated gases expand within the engine cylinder during combustion. They create pressure against a piston, whose reciprocating motion is subsequently transferred into the rotary motion which actuates the engine crankshaft.

The mechanical equivalent of heat is a frequent term used in the academic discussion of thermodynamics. Actually this equivalent as incorporated into the standard conversion factors by formula is:

One B.T.U. = 770 ft. pounds of work

Obviously it is desirable to get the greatest amount of expansion that can be effected within a cylinder of definite dimensions. To achieve this a mixture of gasoline and air in some specific proportion necessary for efficient combustion is compressed prior to ignition (16 parts air to 1 part fuel).

This requires that the piston complete a specific amount of "negative work" in order to attain the greater positive work from the expanding gases. The net work accomplished through a single cycle of operations is the difference between positive and negative work.

There are two types of operating cycles employed by gasoline and compression-ignition engines (Diesel), namely, the two stroke cycle and the four stroke cycle. Which to use depends primarily upon the distribution of positive and negative work in the power plant employing one or the other operating cycles.

In the two-stroke cycle engine the gasoline (in the Diesel, fuel oil and pure air is injected near the top of the compression stroke) is sprayed into the crankcase and compressed. This semi-compressed mixture is then admitted into the cylinder

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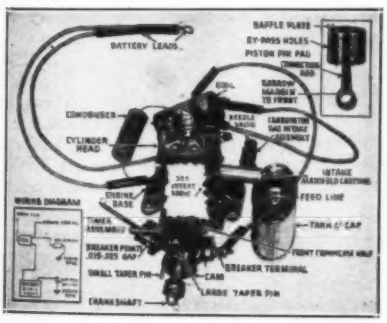

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combustion chamber through a by-pass cored into the cylinder walls, ignited and the burned gases are exhausted through another port at the lowest point of piston travel. The entire operating cycle is completed in two piston strokes—fresh fuel intake charge and compression on the upward stroke; power from the fired explosive mixture and ejection of the burned gases on the downward stroke. See Fig. 2.

The four-stroke cycle engine completes its entire cycle of operations in four strokes of its pistons. In other words, intake, compression, power and exhaust each represents an individual piston stroke. The two-stroke cycle engine does not require valves or valve operating gear, the ports in the cylinder walls being uncovered by the moving piston to perform these functions, with consequent saving in weight and internal mechanical complication. Since a power stroke occurs for each revolution of the crankshaft, or two piston strokes, the two cycle engine has twice the rotating speed of the four-stroke cycle engine which requires two complete revolutions of its crankshaft.

The two-stroke cycle engine has its limitations, however, because of high fuel consumption; much fresh fuel escapes through the exhaust ports. Secondly, there are difficulties in providing adequate cooling. And furthermore, because of crankcase dilution of the lubricants, friction is high in the crankshaft bearings with resulting inefficiency.

The four-stroke cycle engine is employed in practically all aircraft installations, except perhaps in a limited number of foreign compression-ignition engines.

Compression and expansion of gases in an aircraft engine is performed according to the "adiabatic" process. This process means that the total number of heat units in the charge is held constant whether compressed or expanded.

(Bear in mind that temperature always rises with compression and lowers with expansion.)

This should not be confused with the "isothermic" process during which the temperature is constant under compression and expansion. If temperature is to remain constant (isothermic), heat must be lost through the cylinder walls during compression and recovered during expansion, which in this particular case does not contribute to efficiency, and efficiency is a most important factor that aero engine designers must consider in their calculations.

We have seen that heat and work become convertible in the cylinder of the engine, so the ratio of work obtained from the engine to the heat put into it, or thermal efficiency, is expressed by the formula:

$$\text{efficiency} = \frac{\text{heat transferred into horsepower}}{\text{heat supplied}}$$

For example: determine the efficiency of an aircraft engine having a specific fuel consumption of 0.55 pounds per brake hp. per hr. (this is very low; most large radial air cooled engines burn .65 to .70 lbs. per hp. per hr.). Domestic aviation gasoline with a heating value of 21,000 B.T.Us per pound is used as fuel.

$$E = \frac{2545}{C \times H}$$

where E represents the thermal efficiency; C, fuel consumption per b.hp. hour; and H, heating value of fuel; 2545, the heat equivalent of one horsepower hour in B.T.Us.

$$\text{Then: } E = \frac{2545}{.55 \times 21{,}000} = 0.22, \text{ or } 22\%$$

The actual heat losses of the engine represented in the previous example as having a thermal efficiency of 22% would be plotted on a heat balance sheet by the design engineer, the ultimate results being as follows:

HEAT SUPPLIED	HEAT EXPANDED	
100%	To exhaust gases	39%
	To cooling liquid or fins	32%
	As engine friction	7%
	As brake horsepower	22%
		100%

The indicated, or theoretical, horsepower of an engine is that developed within the cylinders by action of the power-producing medium as the various pressure and volume changes affecting it occur. Indicated horsepower can be determined by means of the conventional formula:

$$\text{indicated horsepower} = \frac{PLARN}{33{,}000}$$

where P represents mean effective pressure against piston; L, length of piston stroke in inches; A, area of piston head in square inches; N, number of cylinders; and R, rotational speed of crankshaft in r.p.m.

Assume that a liquid cooled aircraft engine under discussion has the following characteristics:

Mean effective pressure = 140 lbs. per sq. in.

Stroke (L) = 7 inches

Piston diameter = 5 inches (piston area = $\frac{3.1416}{4}$ x $(5)^2$ = 19.6 sq. in.)

Engine speed (R) = 2600 r.p.m.

Number of cylinders (N) = 12

When substituting previous values in the conventional formula, the denominator must be multiplied by 12 to reduce all inch measurements to feet; then further multiplied by two, which has the effect of cutting speed in half. This is on the assumption that the engine is of the conventional four-stroke cycle delivering a power impulse only on alternate revolutions of the crankshaft. Substituting we have

$$\frac{140 \times 7 \times 19.6 \times 12 \times 2600}{33{,}000 \times 12 \times 2} = 756 \text{ horsepower}$$

Should the engine be of the two-stroke cycle type, it will develop 2 x 756 or 1512 hp. because this type delivers a power impulse for each revolution of the crankshaft.

In actual practice and for promulgating specifications for propeller design purposes, the rated r.p.m. of an engine is expressed in terms of b.hp., defined as actual power, i.e. power delivered at the propeller. This factor is determined in actual practice by a dynamometer, an electric generator directly coupled to the crankshaft. The engine is run, loading the generator and its electrical power output is determined by applying the standard conversion factor: 1 hp. is equal to 746 watts.

Liquids are composed of a large number of molecules held together by mutual attraction. When heated, the molecules are given high velocities and the spaces between them are enlarged. After a time, some of these molecules are enabled to escape from the surface of a liquid altogether. This phenomenon is known as evaporation. It is evident that only the most rapidly moving molecules will escape in this manner. This process has the ultimate effect of reducing the average speed of the molecules in the liquid with a resultant decrease in temperature during evaporation.

Aircraft engine designers have incorporated the principle of evaporation into a method of steam, evaporative cooling already being employed on some large output liquid cooled power plants (indirectly-cooled). A factor known as latent heat of evaporation is introduced here, and to explain it simply, assume that a specific quantity of heat must be applied to cause a liquid to change from the normal into a vapor state. As the liquid evaporates, this heat will be taken from the remaining liquid and surrounding bodies, resulting in a temperature decrease. An everyday illustration is when the air suddenly becomes cooler due to evaporation of water sprinkled on a hot pavement.

We readily perceive how efficient steam cooling of aircraft power plants can be accomplished after comparing the following. For a temperature rise of 20° Fahrenheit, one pound of jacket cooling water will carry off 20 B.T.Us of heat to be radiated and evaporated. One pound of steam, with the same temperature rise, will carry off 990 B.T.Us, or roughly 50 times as much as the water alone.

Chemical cooling works on a somewhat similar principle. The boiling point of water is 212° Fahrenheit, while the boiling point of the chemical coolant is approximately 300° Fahrenheit. Thus the gain of 88° rise in the coolant before boiling permits the engine to run at a hotter temperature and develop more output without the coolant boiling away. The usual chemical coolant is ethyleneglycol and its inherent advantage is that less liquid may be carried to perform the same function as the usual quantity of water required.

Less radiator is necessary and water weight is cut down to approximately half. On an airplane, this means considerable saving in weight without sacrifice of engine efficiency. Except that chemical coolants are inflammable, and somewhat increase maintenance, they perform equally as well as water except with extreme rates of super-charging. Chemical cooling systems are being extensively employed in foreign Diesels.

SEE PAGE 5

Air Youth of America

(Continued from page 32)

aviation development.

"When the Civil Aeronautics Authority was first set up," Mr. Hinckley said, "we discovered some appalling things. Germany at that time had over a million boys, Hitler Jugend, in primary schools, building model airplanes. Over 100,000 boys were in gliding and soaring camps. Sixty-five thousand were being trained annually for pilots and mechanics, with a minimum of 25,000 being finished and put into the air services. But we (in the United States) have got to go still further; we must increase the importance of what you citizens are doing. . . . I would like to see impetus that would actually put every school in the program, every school in the United States, by the beginning of next fall."

Model Builders Featured in New Moving Picture

An exciting new serial movie, titled "Sky Raiders," featuring the story of a boy who is an expert model builder and member of Air Youth of America, is shortly to be released by Universal Pictures. Tim Bryan, played by Billy Halop, young Universal star, portrays an expert model builder who is given a job in the aircraft factory of the Sky Raiders, a crack aviation organization doing experimental work for the U.S. Army Air Corps.

Each episode features sequences dealing with model planes, and in one an exciting contest held at Denver is shown.

Arrangements are now being made cooperatively by Air Youth and Universal Pictures to assist theatre managers who wish to sponsor model plane exhibitions in connection with the showing of this film in their locality.

Priority for Model Aviation

Possibility of a ruling by defense officials, at the Office of Production Management, to permit purchase of metals essential to model plane motors, is the result of the combined efforts of leading model manufacturers, the Academy of Model Aeronautics and Air Youth. A situation which threatens a serious curtailment in the production of model motors and other accessories was outlined in a letter from Irwin Ohlsson of Los Angeles, who asked for Air Youth's cooperation in presenting the problem to the Office of Production Management, in charge of priorities.

With Cliff Rogers, president of the Model Industry Association, a study of the situation and an appointment with the proper authorities was made. In a public statement, Air Youth took the position that "model aviation has been called the cradle and experimental laboratory of aviation. As such it is an essential part of America's national program of aviation preparedness. With great sums being spent for trained personnel adequate for America's aviation needs, it would be short-sighted indeed to cut off the activity which has been the training school of some of the industry's leading figures. Air Youth pledges itself to do all possible in securing the immediate assistance needed."

At the time of writing no definite developments can be reported, but the model builders of the country can know that everything possible is being done to see that their needs are not forgotten in the national emergency.

AYA Scholarships

The three big scholarships for training at nationally known aviation schools have not yet been awarded to contestants in Air Youth's scholarship competition; the judges are still making final selections. More than a thousand boys entered the competition—a remarkable showing in view of the extremely high qualifications required.

In the next issue of MODEL AIRPLANE NEWS the winners will be announced; watch this column for their names.

A Stick Contest Winner

(Continued from page 23)

are drilled as indicated and are necessarily at an angle, as you will see when the triangles are put in place, else the tail plug will not go through them. There is a balsa triangle the same size as the pine ones, cemented in front of them as reinforcements. You must necessarily get a good cement fit on these triangles for needed strength. The tail plug is a 5/32" dowel, 2-1/2" long. The section just below the tail plug mounting on the left side is left open for removing and attaching the rubber motor and also to get at the small .028 wire hook to which the 1/8"

rubber band that loops the stabilizer on is hooked.

The top longeron and last top crossbrace are cut off at the points indicated on the plans and small triangles of 1/8" sheet cemented under either side of the top longeron to give a smoother airflow on back over the stabilizer. Another 1/8" sheet triangle is cemented in between the last bottom crossbrace and lacks 1/16" of coming level with the right and left longerons.

When you get to it, the stabilizer is looped on with a rubber band over the small hook on the bottom longeron, brought up through the fuselage, over the stabilizer and looped over the rear tip of the fuselage.

Wing

First cut out all ribs of 1/16" medium sheet and the other irregular pieces from 1/8" sheet. Lay down the trailing edge, cementing the irregular pieces at the tips together, and then pinning down the spar which is blocked up 3/32" except at the tip. The part of the spar from the outer dihedral joint to the tip is tapered from 1/8" x 1/2" to 1/8" square. After spar and trailing edge is laid down cement the ribs in their respective positions. Be sure the spar fits well up into the ribs so that the spar will not touch the covering when the wing is covered. When the ribs have dried in place thoroughly take a 1/4" square medium strip and cement it in position around the front ends, of the ribs pinning it firmly against them. All of this should dry thoroughly before taking it up from the workboard.

When putting dihedral in the wing cut notches in the top of the leading, trailing edge and spar, using the "cut and try method" to get the right amount of dihedral. Cement the dihedral joints, block up the end of the wing the right amount, allow to dry, after which the G2 and G1 gussets are cemented in place. The leading and trailing edges may now be cut and sanded to shape, as indicated on one of the ribs on the plans. Now cement a 1" strip of 1/32" sheet over the center rib.

Stabilizer and Rudders

In building the stabilizer use the same method as on the wing except the end ribs are 1/8" thick and the rest 1/16" thick. Small triangles of 1/8" sheet are cemented inside the leading and trailing edges against the end ribs. Cement a 3/4" strip of 1/32" sheet over the center rib.

Make four halves of the rudders from 1/8" sheet as indicated full size on the plans and cement them together, thus making two rudders, which are cemented in place after the stabilizer has been covered.

Prop and Nose Block

Make the nose plug from a one-inch cube of medium balsa and cut to shape as shown on the plans. Then cut a square from 1/4" sheet to fit snugly in the nose of the fuselage and cement it to the nose block. After this has dried mark the top of the nose plug and drill a 1/16" hole through the center of it, with about two degrees right thrust. Cut a 6" length of .063 wire for the prop shaft, run it through the hole in the nose plug, slide small bushings down over either end of the wire onto the nose plug and cement in place.

Cut the prop block from a piece of medium balsa 2" x 1-5/8" x 9-1/2". Carve the blade to shape with about 3/16" undercamber and sand smooth. Cut the blade even with the hinge AFTER it and front bushing have been cemented and bound firmly in place. Now bend the counterbalance wire from .040 wire, cement and bind to the prop hub in position as shown on the plans. Make a small mold by wrapping a strip of paper around a round pencil and then cement it to a scrap of balsa. Hold the end of the counterbalance wire in the center of the mold and pour melted lead into it to make the counterbalance.

Give the prop two coats of wood filler and then two of clear dope, sanding between each coat. Only after prop has been doped may the lead be cut down till the prop balances. After the prop shaft has been bent to shape as indicated on the plans put the nose plug, prop, etc., together and place the nose plug in its position in the fuselage. Now fold the prop on the lower left-hand side of the fuselage and pin it in this position to the nose plug. Take the nose plug out of the fuselage and you have the prop in place relative to the nose plug so that it will fold in the correct position. Mark the position for the prop stop.

Covering and Doping

Cover the wing and tail with tissue of

the desired color. When choosing a color remember it should be easily seen in the air and on the ground. Cover the wing's outer top section with two or three pieces of tissue, in order to prevent wrinkles. All other sections can be covered with one piece each. When covering the bottom of the wing be sure and stick the tissue to the bottom of the ribs. Run the grain of the tissue lengthwise with all structures. When spraying with water and when doping be sure to weight the frame work down so that it will not warp while the tissue dries. Don't spray or dope more than one section of the wing at a time. One coat of dope will be sufficient for the tissue, about three coats will be needed for the Silkspan used on the fuselage. Rudders, wing mount and nose plug will need two coats of wood filler and then two of clear dope, sanding after each coat.

Rubber Motor

The rubber motor is made up of 18 strands of 3/16" rubber 36" long, tied together at both ends with rubber bands. Lubricate the motor and after a few tight winds lubricate it again. Continue lubricating every time dry spots appear on it. The motor should be stretched two and one-half times its length, wound half-way and allowed to come in to the nose of the fuselage as the other half of the turns are put in the motor. Our motor took 700 turns.

Flying

First loop the tail and wing on in their respective positions. Balance the model 1/2" forward of the trailing edge of the wing and test glide it. If it stalls add weight to the nose; if it dives add weight to the tail until the glide is flat and long. Starting with a small number of turns (50) launch the ship into the wind and watch the climb. Model should circle to the right under power and the circle should be just small enough to prevent stalling, and no smaller, or it will spiral dive. Gradually add power to the motor and watch the flight critically. Make adjustments only on the thrust line and don't bother the center of gravity or you will affect the glide.

Here's hoping you win many contests!

Slots for Models

(Continued from page 11)

model or whether our slotted wing was doing the trick. We closed the slots with a one inch strip of "Scotch tape" and glided the airplane; It stalled quite easily. As the wing could not be moved and weights were all stationary, the elevator was given positive incidence until the glide was satisfactory. The motor was revved up to the same speed as in the first test, with the open slot, and the ship was flown. The slightest gust of wind proved enough to stall it under these circumstances.

On the second flight the speed was increased so as to add more thrust for pulling out of the stall into a steep climb. However, all that we succeeded in getting was constant looping for a twenty-second duration; yet the model had glided perfectly before.

Then leaving the motor set at the same speed, we removed the tape and the positive

incidence from the stabilizer and once more sent the model aloft. Looking for all the world like a horse that had just been relieved of its bit, the plane flew straight up into the wind. Higher and higher it climbed and we on the ground held our breaths, expecting it at any moment to turn over on its back, for we felt that in so steep a climb it would surely never pull out! However, when the motor cut after twenty seconds, which seemed more like an hour, it leveled out beautifully. The total time was 2.13 minutes, without the help of any thermals at all.

The last test was performed in front of a group of "show me" boys; they won't believe a thing until it is double-checked in front of their noses. They were indeed a difficult audience to impress, believe us; just the kind we wanted. At this particular time about half of those eight skeptics are making good use of slots and the other half will certainly do so when the occasion arises in the very near future.

The real value and worth of slots can not actually be determined until you have used them yourselves or seen them in use. However we will sum up our findings now and give you a brief account of them:

The fuselage was reduced to three-fourths its original length, eliminating a great deal of cross-section, drag and weight.

The stabilizer was reduced ten per-cent and changed from a lifting to a symmetrical section.

The tail moment arm was reduced, which can be appreciated by any one who has ever watched a large man-carrying sailplane or flown a tow-line glider. The short moment arm certainly increases soaring ability and enhances the chance of recovery from any undesirable position into which the plane might be forced.

Another important fact that should be mentioned is that the wing loading was increased from eight and one-quarter ounces to thirteen ounces with no noticeable increase in speed; again proving the remarkable effect of slots on the model. Hence the wing loading can be increased by the use of slots and the model will still fly as slowly as some of the "floaters" which are in use today.

It might be well to notice that the slots only have to be placed near the tip, and if polyhedral is used they are only necessary in the tip panels. As this keeps the wing tips from stalling, it is surely desirable; eliminating the old method of washing-out the wing tips to prevent them from stalling.

At various contests we saw perfectly good models destroyed because they had to be flown in a tighter spiral than usual. This was necessitated because of an increase in wind velocity and improper rudder adjustments. With the use of slots the ship can be flown directly into the wind without any danger of looping.

The slot shown in type A is the better one to use; the amount of drag set up by type B showed slightly in the glide, while in type A none was noticeable. Both of them, however, are desirable and heartily recommended as a vast improvement over those models without wing slots.

When constructing a wing with slots the best method is to make each part as a separate wing, connecting them with joining plates at various intervals. Always make

sure that the opening is exactly like that shown in fig. A. Use the usual manner of wing construction, employing C stock for ribs, and A stock for covering sheeted sections. This will give a smooth curve with ease.

When you test-fly your model take along some "Scotch tape" to prove for yourself the effect and advantages of wing slots. We are certain that even the most skeptical of you will be overjoyed at what you see.

Frontiers

(Continued from page 21)

harmonize with progress, twenty-four new tenders will see service together with several ex-minesweepers.

Getting to the usual theme of things, all this has a definite bearing on the design of new aircraft. While most countries, especially Italy, Japan and Germany, are still having their troubles designing aircraft that will safely and successfully take off and land on aircraft carriers, let alone do combat work, the U. S. Navy has overcome that stage of the game and is now able to concentrate on high performance. Many Navy ships soon to operate from our large aircraft carriers now in service will be among the fastest in the world. We will be the first to operate twin-engined fighters from our carriers, namely the Grumman Skyrocket.

A little-known company in Santa Monica, California, The Freeman Aircraft Co. by name, is projecting a twin-engined scout and dive bomber to be flown off the decks of carriers. In general appearance it is similar to the Douglas Bostons, except it is smaller. It is of high mid-wing design with nose wheel, two radial engines and a long slender fuselage to provide tandem seating for the crew of three. All bombs are carried within and the plane will be heavily armed for combat. The outer panels undoubtedly fold upwards and lap right over the center section and fuselage. A twin-engine aircraft of this Freeman type can be readily designed for folding the wings.

Since the adaptation of the Douglas TBD-1 torpedo bombers for carrier duty, the Navy has conquered the mass operation of large aircraft from carriers and is already prepared to take on the twin-engine airplane and other large craft. The Curtiss XSB2C-1 is by no matter of means a small airplane; it is about the size of the North American O-47 and has double the performance of Curtiss' previous scout-bomber, the SBC-4, which illustrates the Navy's strides to produce a real fighting air force.

Here are the specifications of the new Curtiss SB2C-1 dive-bomber: Overall Length, 35.2 ft.; Span, 49.7 ft.; Height, 16.7 ft.; Wing Area, 422 sq. ft.; Weight Empty, 7868 lb.; Useful Load, 3114 lb.; Gross Weight, 10,982 lb.; Wing Loading, 26 lb./sq. ft.; Power Loading, 6.4 lb./sq. ft.; Fuel Capacity, 290 gal.; Oil Capacity, 18 gal.; Engine, Wright, GR 2600-B5.

Despite the fact the plane is rather large, it handles like a pursuit with 1700 hp. up in the nose. Its takeoff acceleration is undoubtedly fast, making it good for carrier work. Here is what H. Lloyd Child, SB2C-1 test pilot, has to say about it in the "Curtiss Flyleaf" in comparison with the previous dive-bomber:

1. Carries twice the number of heavy bombs; they are housed internally.

2. Has better than twice the range to protect our shores or our fleet 600 miles further away than previously.

3. Has increased endurance so that it could stay in the air 4-1/4 hours longer than could be done previously.

4. Attains a maximum speed 100 m.p.h. faster than its predecessor.

5. Doubles the amount of armament to give a greater fire-power than any other single-engine naval airplane.

6. Incorporates all kinds of improvements such as automatic pilot, large, comfortably upholstered pilot's seat, folding wings, power operated bomb doors, self-sealing tanks and armor plate.

With things under control in the big carrier operations, we wonder how things will turn out on the smaller "S.S. Mormacmail." Will aircraft have to be specially designed to operate from its restricted deck? There is no worry about taking off because large powerplants are now available giving exceedingly high acceleration for takeoff. If any additional boost is necessary catapults may also be used, of which more later. The landing on small carriers is the bothersome creature. Since these boats are not designed to take on the whole world in combat, as the larger vessels may have to do someday, the Navy may be able to sacrifice some speed in order to make safe landings everlasting. After all, the airplanes will spend most of the time searching and very little in actual encounters with submarines and cumbersome enemy long-range airplanes . . . we think. Another reason for slow landing speeds on planes of this type is that they may be compelled to operate in very sloppy weather which makes the carrier deck a mobile unit indeed!

With acquisition of more seaplane tenders, our long-range flyingboats may be able to fly thousands of miles out to sea and refuel at the tenders, if the sea is calm, and reconnoiter over expansive ocean areas of greater scope than even the aircraft carrier can do today. It appears that here a real seagoing flyingboat is the order of things.

Curtiss has a speedy little trainer under way for the Navy by the name of SNC-1. It is a development of the CW-22 advanced trainer of all-metal, low-wing design with tandem seating. This airplane has seen many variations in design, both sport, fighter and trainer, and is almost on a par with North American's trainers in that instance. Did you know that North American has produced about thirty different designs patterned after its trainer?

Most of our battleships carry three or four airplanes, the heavy cruisers four or five and the light cruisers about two. These are all catapult aircraft. And now we come to the Royal Navy. The brand new "King George V" carries three airplanes while those of the "Renown," and "Queen Elizabeth" class carry four, the remainder of the British battleships one or two. Britain's "Ark Royal" carries 60 airplanes, but with loss of the sister ships "Glorious" and "Corageous" the airplane quota for the carriers "Furious," "Eagle" and "Hermes" are 33, 21 and 15 respectively. The "Illustrious" has since been put into commission

with several more sister ships to follow shortly which may have slightly more aircraft than the "Ark Royal." Most British cruisers carry one or two aircraft, while the latest now carry three shipboard aircraft. The British also have some aircraft carrier trainers, as they are called, namely the "Albatross," "Pegasus" and the "Unicorn" which is now being built. Another ship, the "Argus," is being used for operation of wireless-controlled "Queen Bee" aircraft, as last we heard. A unique feature of some of the British ships is the battleships are equipped with hangars for storing aircraft, even some of the cruisers are so equipped. Battle cruisers of the Renown class have catapults flush with the deck, extending from one side of the deck. These catapults are fixed, which requires steering of the ship to "aim" the catapult. Two of these flush-type catapults are in the bow of the aircraft carrier Ark Royal.

As the war goes on we of course receive very little information of British naval aircraft, and as a matter of fact we have gained no information from England since the war started. However, we doubt if much has been done to equip the fleet with anything modern, in view of the fact that much comment has appeared in English periodicals to the fact that the fleet air arm is in a serious state of need. It is true that Skuas and Fulmars have been added, the Fulmar being the fastest in the fleet yet is surpassed by the Grummans now being delivered to Great Britain. The fact that Sharks were used to sink most of the Italian Navy recently proves that they are still operated from carriers, and though they can destroy as they have, one must admit that they are very outmoded aircraft in comparison with new equipment. It is without doubt that many American aircraft will find their way to the decks of ships of the Royal Navy.

So much for the fleet. We have in our possession an annual report from North American Aviation Inc. that a version of its Mustang pursuit is being built for the U. S. Army Air Corps, to be known as the XP-51 "Apache." North American states in the report, "The most sensational development to emerge from the Inglewood factory during 1940 was the NA-73 single seat fighter—a streamlined wonder powered with an Allison Engine—which is unofficially credited with being the fastest military airplane in the world today at its operative altitude."

The Mustang is not just another high-speed pursuit which gains its momentum by the adding of more horsepower and general cleaning up of lines; it has many aerodynamic features, newly created, that give it the added touch of speed. Watch this airplane. North American also states that one of its new confidential designs, a type reportedly the most effective yet developed, is scheduled to begin flight tests during 1941.

Many interesting things are taking place in the way of new aircraft designs at the Curtiss-Wright Buffalo and Robertson plants. At Robertson, Missouri, both a single engine and *twin-engine* trainer, in large quantities are on order for the Air Corps.

Other advanced trainers for the Air Corps are the Beech AT-10 and the Republic AT-12. Both have been completed and flown. The AT-10 is a smaller and lighter all-metal, low-wing version of the AT-7A built by Beech. It has a single rudder in place of the double vertical tail surfaces of the former Beech twin-engine airplanes. In many respects it looks like Cessna's AT-8. We also hear that Beech has an attack-bomber up its sleeve!

The AT-12 is the same as the Republic P-43 pursuit to afford the pilot practice in flying high-speed aircraft before actually doing combat training. The P-43, as you probably know, has an exhaust driven turbo-supercharger in the fuselage belly aft of the pilot. Republic is now working on the XP-47B.

Another new training plane that may make its appearance is that being contemplated by the Ensign Aircraft Corp. of San Diego. It is a twin-engined amphibian powered by the new Lycoming 175 hp. six-cylinder engines. The wing span is 65 ft., length is 40 ft. With a flat, opposed cylinder engine, such as the Lycoming, the powerplant installation should be very aerodynamically "clean." If everything goes well the amphibian will do 150 m.p.h. in "high gear." Construction will be of wood and plastics. A combination of this sort should make a very sleek little plane.

The new light plane engines that have been coming out on the market mean many ramifications, innovations and a "slew" of ultra-varied designs of small planes.

Arizona's first school for training pilots under private contract for the United States Army was dedicated at Phoenix, Arizona by Southwest Airways, Inc., Memorial Day, May 30, when the first class of cadets graduate. The $500,000 training plant, established under the supervision of Leland Hayward, Hollywood agent, TWA director and well known flier, was christened Thunderbird Field. Actively supervised by John Connelly, well known aviation figure formerly in charge of flight testing for the Civil Aeronautics Authority on the Pacific Coast, now manager of Southwest Airways, Inc., the staff of 35 instructors at Thunderbird Field, 15 miles northwest of Phoenix in the Glendale district, is already training student fliers. The original contingent of 57 cadets was sent here by the Army from Kansas and Arkansas. Second class of approximately the same size will arrive next week.

The training school, the forerunner of the development of a vast Army air center in this section of Arizona, has literally "sprung from the desert" in the last three months. Designed by Millard Sheets, a California architect and artist noted for his originality in design, the school is one of the most modern. All buildings are air conditioned. A baseball field, volley ball courts, tennis courts, swimming pool are being constructed for the cadets.

Initial size of Thunderbird Field is a square mile. Extended to full capacity it will handle 1,000 cadets. At present it consists of an administration building, hospital, control tower, two large hangars, classroom building, mess hall and kitchen, recreation hall and barracks.

Governor Sidney P. Osborn of Arizona

and other government officials joined in the dedication in which Army officers participated.

Captain Lawrence Brown is the Commanding Officer for the Army and is assisted by Lieutenants Lynn Mapes, Robert DeBusk, Lauren Driesbach, and Eldon Brummett. Medical Officer in charge is Captain Bloyce Britton.

First of Army Air Corps fields in the Phoenix area is being constructed at Litchfield Park a few miles from the Southwest Airways school. It will be an advanced training base.

Model Designing Simplified

(Continued from page 13)

fasten it to points between bulkheads as this causes unnatural strain on the structure and consequent breakage.

9. Now determine the wing details. Though the wing should be simple it should also be efficient; more so than a single surface, all balsa one. Consequently a doublesurface type is required. Select and lay out the wing section to be used; the Grant X-9 is chosen because of its excellent climbing and gliding characteristics.

One of the simplest ways to make a doublesurface wing is with ribs and spars covered with paper. Another method is to cement ribs to the underside of a thin 1/32" balsa sheet, the leading and trailing edges of which have been reinforced with extra strips of balsa. Then the wing undersurface should be covered with paper. The reader may use either method; here the all-paper covering is adopted.

On the drawing, space the rib centerlines 2" apart, measured from the wing center, at which point insert two ribs, 1/8" apart. One inch from each tip put in one extra rib. Between the ribs at the leading edge false ribs are inserted, half-way between each full one. These should extend rearward to, or slightly past, the front spar.

Next draw in the centerlines of the front and rear spars, 5/8" and 2-1/8" respectively from the leading edge.

10. Now insert the wing section in the side view; a solid line for the lower contour and a doted one for the upper.

11. Draw in the wing side view outline, indicating the curved tips within the oblong space of the wing layout drawing. (See diagram.)

12. The wing must be attached to the body, therefore some arrangement of struts should be worked out. An excellent one is to cut out a contour from 1/16" balsa sheet which is placed vertically, the upper end passing between the two center ribs of the wing to which it is cemented, and the lower end fastened within a balsa block resting on the fuselage top. This block serves as an excellent base for the wing unit and may be slid backward or forward for adjustment, while insuring rigidity.

The wing can be prevented from rotating about the upper end of the contoured wing support, and possibly breaking, by wire struts extending from points approximately 2" on either side of the centerline down to the fuselage. These struts can be made in two units, one on the forward spar and one on the rear. Each will extend from one wing down to the fuselage side, up slightly over the top of the base block, slightly down the other fuselage side and then upward to the wing. The general shape is shown in the front elevation drawing, diagram 3.

13. Draw the fuselage outline in the top view. The side should be straight from the first to the fifth bulkhead shown in the side view. By using this form most bulkheads may be the same width, simplifying construction. From the fifth bulkhead rearward, curve in the fuselage sides to a point at the rear of the stabilizer. Curve in the

Memo to all Hobby Dealers

Be sure and read the important announcement on page 58. It's a sales tip that should be heeded!

nose from the first bulkhead with a graceful line in similar manner. The maximum width of the fuselage should be 1-1/4".

14. In the front view layout, draw in the outlines of the plane as required by the design. Start with the wing. The single lines of the basic layout indicate the trailing edge. The leading edge should be drawn in 3/16" above this line, parallel to it. Then indicate the top line of the wing. At the tips curve the trailing edge line up and the top line down to meet the leading edge line.

Draw in the fuselage cross section, inserting the struts supporting the wing. Then draw in the wheels and indicate the landing gear struts, extending from points on the side of the fuselage, slightly above the lower corners to the inner face of the wheels. At a point near the wheels bend the wire to form a vertical shoulder, as indicated on the drawing. At the upper end of the struts bend the wire into a "U" which passes beneath the fuselage. Indicate this by a dark heavy line.

15. Indicate the fuselage bulkhead centerlines in the top view; also the nose block, propeller shaft and rear motor hook. Beneath the wing the base block may be drawn, its front and rear edges rounded.

16. In the top view, indicate the fin over the stabilizer, parallel to the fuselage centerline, and draw in stabilizer ribs. This surface is made of thin balsa sheet which, being delicate, may easily break or warp; consequently two thin strips of 1/32" balsa, 1/8" wide, may be cemented over and under the stabilizer at points midway from its centerline to the tips. (See diagram, fig. A.) The strips passing across the grain in this manner makes this surface very strong.

17. Indicate the propeller shaft, landing gear struts and wheels. When this is completed you have indicated and located all the major parts of your plane.

The next step is to design each individual part, laying them out in complete detail for building; in other words, making working drawings. How to do this will be explained in the next article, together with a complete set of detailed plans for constructing the model.

Until then, happy landings!

Academy of Model Aeronautics

(Continued from page 10)

Penna.

Jack Elmore, 3421 Tulane Ave., Oakland, Calif.

Richard Engle, Freeport, Illinois.

Alton Esteves, 3437 Bruxelles St., New Orleans, La.

W. K. Henze, 1920 Lakeland Ave., Lakewood, Ohio.

Robert Houston, 2474 State St., Granite City, Illinois.

Don Hyslop, Maple Bluff, Madison, Wisc.

James Kahremanis, 5116 S. Clarendon, Detroit, Mich.

Robert W. Lee, 3125-21st Ave. So., Minneapolis, Minn.

Ted Lisiecki, 1239 W. 51 St., Chicago, Illinois.

John Miller, 1372 State St., New Haven, Conn.

Willie Walter Moore, Century, Fla.

Larry Muller, Burch Ave. N.W., Cedar Falls, Iowa.

Harry E. Pape, 22 Garfield Ave., Norwood, Penna.

Joseph Querforth, 469 W. 24th St., Chicago, Illinois.

John Sonner, Sunnyside, Washington.

Neil Stolk, 15 Belleview Pl., Palisade Park, N. J.

Donald Taylor, Mercedes, Texas.

Toshio Tsubota, 1003 A St., Fresno, Calif.

Arthur K. Woodman, Box 1211, Highlands Lodge, N. C.

New Clubs on the Alert

Evidence of increased interest in Academy activity are the many new chapters which have been established recently.

Among organizations which have been granted A.M.A. charters are the Michiana Model Aero Club, South Bend, Ind. and the Toledo Balsa Manglers of Toledo.

Martin H. Farrell, senior advisor for the Michiana Model Air Club and Arthur H. Rice, long time N.A.A. booster, who holds the same position for the Toledo Balsa Manglers, are to be congratulated for the care taken in compiling necessary forms and applications required by the A.M.A. for chapter recognition. The applications from these new South Bend and Toledo groups were complete and typewritten, making it possible for National Headquarters to expedite charter recognition.

Leaders Ferrell and Rice both stated in correspondence that modeling interest is running high in their respective localities.

Academy Technical Chairman Conducts Model Aircraft Course

As a practical demonstration of the wide experience of Academy Headquarters' officials in aeromodeling activity, Bruno P. Marchi, chairman of the A.M.A. Contest Board, is conducting a model airplane course for the Boys Club of Washington.

The course was started recently as a result of an invitation extended by Stanleigh L. Jenkins, Supervisor of Crafts for the Eastern Branch of the Boys Club. More than 50 youngsters are enrolled. Meetings are held in a modern hobby craft workshop each Monday, Wednesday and Friday evening from 7 to 9.

So popular is the aeromodeling course, plans have been made to divide the group into two classes. Bruce McElroy, A.M.A. gas modeler No. 1592, formerly of St. Augustine, Fla. and now with the F.B.I. in Washington, D.C., is assisting Mr. Marchi.

Instruction is given in principles of aerodynamics and design, construction and adjustment of flying model aircraft. Of importance is the emphasis placed on the adjustment of flying characteristics.

Beginning with glider models constructed of paper, the Boys Club has advanced rapidly with balsa wood gliders, study of propeller carving and the methods of bending wire. The boys have already constructed two stick type rise-off-ground flying models. Now engaged in construction of an indoor stick type hand-launched model, members are making plans for their first competition and it is expected that a "Flying Circus" will be held soon.

Materials and facilities for the course are furnished by the Club to members at no charge and models are built from plans drawn by Mr. Marchi. Before the completed models can become the property of builders, their test flights must pass minimum standards set up for that particular type of model aircraft. This procedure, followed for the first time in this type of work, has attracted much favorable comment.

N.Y.A. Assistance Aids Academy

As a corollary to the A.M.A. financial statement recently presented, we should like to take this opportunity to point out that a great deal of assistance has been given the Academy during the past year through personnel supplied by the National Youth Administration.

As an educational and scientific organization, the A.M.A. and the parent body, the N.A.A. are given the assistance of N.Y.A. help at no charge. Had it not been for this assistance which has been most helpful in checking files, addressing envelopes, making up sets of credentials and assisting in general office procedure, the cost of labor would have been greatly increased over that reflected in the financial statement.

NATIONAL RECORDS

INDOORS (Longest Flight)

Stick Model, H.L., Class B		
Junior: Martin Friedland	Philadelphia, Pa.	18:55.5
Senior: George Micot	Allentown, Pa.	20:46.0
Open: Bruno P. Marchi	Washington, D. C.	15:10.0
Stick Model, H.L., Class C		
Junior: R. Jagiello (deceased)	Chicago, Ill.	19:17.3
Senior: Martin Nemirofsky	Philadelphia, Pa.	18:22.6
Open: M. S. Andrews	Philadelphia, Pa.	26:39.0
Stick Model, R.O.G., Class A		
Junior: Arthur Saltzman	Philadelphia, Pa.	10:09.0
Senior: Milton Huguelet	Chicago, Ill.	12:23.5
Open: Hyman S. Oslick	Philadelphia, Pa.	15:32.0
Stick Model, R.O.G., Class B		
Junior: Martin Friedland	Philadelphia, Pa.	17:00.0
Senior: Martin Friedland	Philadelphia, Pa.	19:56.5
Open: Frank Haynes	New York City	12:37.3
Stick Model, R.O.W., Class A		
Junior: None Established		
Senior: Ted Gonzoph	Philadelphia, Pa.	10:51.0
Open: M. S. Andrews	Philadelphia, Pa.	8:04.4
Stick Model, R.O.W., Class E		
Junior: Arthur Saltzman	Philadelphia, Pa.	14:10.2
Senior: David Call	Philadelphia, Pa.	15:49.0
Open: None Established		
Glider, H.L., Class A		
Junior: Otto Curth	Chicago, Ill.	:44.7
Senior: Dushan Deschich	Chicago, Ill.	:46.2
Open: Leo Vartanian	Chicago, Ill.	:54.3
Glider, H.L., Class B		
Junior: Otto Curth	Chicago, Ill.	:44.7
Senior: M. Phillips	Boston, Mass.	:42.4
Open: None Established		
Fuselage, R.O.G., Class B		
Junior: H. Kaczynski	Detroit, Mich.	12:42.3
Senior: Harry Lerman	Boston, Mass.	13:30.0
Open: C. Werle	San Francisco, Calif.	13:48.6
Fuselage, R.O.G., Class C		
Junior: R. Jagiello (deceased)	Chicago, Ill.	11:32.3
Senior: Gordon Cain	Boston, Mass.	15:53.0
Open: Ervin Leshner	Philadelphia, Pa.	15:33.6
Fuslage, R.O.W., Class B		
Junior: None Established		
Senior: William Hawkes	**Philadelphia, Pa.**	**3:26.0**
Open: None Established		
Autogiro		
Junior: None Established		
Senior: Ralph Brown	Boston, Mass.	2:51.2
Open: Joseph P. Matulis	Chicago, Ill.	1:03.0
Ornithopter		
Junior: Richard Quermann	Clarksburg, W. Va.	:17.3
Senior: Robert Gibbs	St. Louis, Mo.	2:01.1
Open: Ed Lidgard	Chicago, Ill.	3:01.8
Helicopter		
Junior: Richard Quermann	Clarksburg, W. Va.	3:54.6
Senior: Harry Lerman	Boston, Mass.	5:13.8
Open: Joseph P. Matulis	Chicago, Ill.	2:12.4

OUTDOORS (Three Flight Average)

Stick Model, H.L., Class C		
Junior: L. Vargo		
Senior: Roy Messinger		
Open: Chester D. Lanzo		
Stick Model, H.L., Class D		
Junior: Clarence Roberts		
Senior: Robert Davis		
Open: Toful Petraitus		
Stick Model, R.O.W., Class C		
Junior: Bill Seegmiller		
Senior: Gordon Peterson		
Open: John Schneider		
Stick Model, R.O.W., Class D		
Junior: Bill Seegmiller		
Senior: Non Established		
Open: John Schneider		
Glider, H.L., Class E		
Junior: Austin Rinaldi		
Senior: Charles Richbourg		
Open: C. W. Johnson		
Glider, H.L., Class C		
Junior: Bob Codde		
Senior: Stewart Bennett		
Open: John Schneider		
Glider, H.L., Class D		
Junior: Bob Codde		
Senior: Clifford Doyle		
Open: H. Thomas		
Glider, T.L., Class C		
Junior: Robert Hine		
Senior: Ray Frodey		
Open: Mike Morel		
Glider, T.L., Class D		
Junior: James Kelly		
Senior: Owen Niehaus		
Open: Albert Reed		
Glider, T.L., Class E		
Junior: None Established		
Senior: Harold Geres		
Open: George Brown		
Autogiro		
Junior: None Established		
Senior: Bob Meuser		
Open: None Established		
Helicopter		
Junior: None Established		
Senior: Bob Meuser		
Open: None Established		
Ornithopter		
Junior: None Established		
Senior: None Established		
Open: None Established		
Fuselage, R.O.G., Class C		
Junior: Rich. Quermann		
Senior: Walter Seegmiller		
Open: Walter Fromm		

OUTDOORS (Three Flight Average)

Fuselage, R.O.G., Class D				
Junior: William Stewart	Chicago, Ill.	5:01.4	Huntington, W. Va.	5:09.1
Senior: Caldwell C. Johnson	Linden, N. J.	11:15.0	Hampton, Va.	7:14.0
Open: Norbert Lisiecki	Cleveland, Ohio	14:49.2	Cleveland, Ohio	5:05.3
Fuselage, R.O.G., Class E				
Junior: None Established				
Senior: Armond Nielson	Clarksburg, W. Va.	6:11.8	Lakeland, Fla.	1:07.0
Open: Edward L. Smith	Clarksburg, W. Va.	8:04.3	Jacksonville, Fla.	1:31.1
Fuselage, R.O.W., Class C				
Juior: None Established				
Senior: Manuel Andrade	Akron, Ohio	7:02.6	Oakland, Cali.	1:22.2
Open: John Schneider	Lakeland, Fla.	1:04.0	Scotia, N. Y.	:48.6
Fuselage, R.O.W., Class D				
Junior: Robert J. Bates	Oakland, Calif.	:48.0	Clarksburg, W. Va.	2:33.0
Senior: Robert Davis	Scotia, New York	:22.3	Clarksburg, W. Va.	3:11.0
Open: James E. Long	Lakeland, Fla.	1:22.2	Clarksburg, W. Va.	2:30.0
Gas, R.O.G., Class A				
Junior: R. Lieber	Scotia, New York	:42.4	Philadelphia, Pa.	2:07.9
Senior: Joseph Beshar	Jersey City, N. J.	2:05.0	Paterson, N. J.	16:39.0
Open: W. Gibson	S. Augustine, Fla.	2:49.5	Hamilton, Ohio	15:50.7
	Jacksonville, Fla.	1:24.1		
Gas, R.O.G., Class B				
Junior: Bobby Davis	Oakland, Calif.	:26.3	Atlanta, Ga.	21:33.8
Senior: B. Redeker	Oakland, Calif.	1:07.0	Cincinnati, Ohio	9:20.3
Open: Dr. R. E. Podolsky	Scotia, New York	:21.0	St. Louis, Mo.	13:46.0
Gas, R.O.G., Class C				
Junior: Larry Maze, Jr.	Oakland, Calif.	:21.3	St. Louis, Mo.	9:19.5
Senior: J. Leiendecker	Jacksonville, Fla.	:34.6	Fort Wayne, Ind.	10:08.3
Open: J. Konefes	Akron, Ohio	:46.4	Chicago, Ill.	19:18.5
Gas, R.O.W., Class A				
Junior: None Established				
Senior: Phil Weatherwax	Gloversville, N. Y.	:53.8	Pittsburgh, Pa.	:29.3
Open: None Established	Pittsburgh, Pa.	1:34.4		
	Cleveland, Ohio	1:24.0		
Gas, R.O.W., Class B				
Junior: None Established				
Senior: Fred Gross	Rennerdale, Pa.	:39.1	Cranford, N. J.	:36.5
Open: Elmer Wasman	Rochester, Pa.	5:42.0	Lakeland, Fla.	:14.0
	Schenectady, N. Y.	1:35.2		

(Continued on next page)

Gas, R.O.W., Class C

Flushing, L.I., N.Y.	5:52.0	Junior: None Established			
Jersey City, N. J.	1:47.7	Senior: R. Meuser		Oakland, Calif.	1:18.8
Oakland, Calif.	:11.3	Open: Donald K. Foote		Oakland, Calif.	2:48.4
Oakland, Calif.	:35.4				
Clarksburg, W. Va.	4:0.8				
Lakeland, Fla.	6:35.4				
Chicago, Ill.	3:26.5				

RECORDS

NATIONAL RECORDS. Perpetual American model aircraft duration records are homologated by the Contest Board of the Academy of Model Aeronautics. Perpetual records may be established at any time and shall continue until exceeded or affected by changes in the official regulations.

ACCEPTANCE OF RECORDS. No record is official until it has been homologated by the Contest Board of the Academy of Model Aeronautics. Only duration records for flying model aircraft are officially recognized. All records to be eligible for recognition must be made in sanctioned competition under the regulations of the Academy of Model Aeronautics.

SCORING OF FLIGHTS

INDOOR. Scoring time for indoor models shall be the longest of 3 official flights for powered models; the longest of 9 official flights for non-powered models. Flight duration shall be scored to the nearest tenth of a second.

OUTDOOR. Scoring time for all outdoor models except hand-launched gliders shall be the average elapsed time of 3 official flights. Scoring time for outdoor hand-launched gliders shall be the average elapsed time of the 3 longest of 9 official flights. In computing average elapsed duration time in seconds the second numeral to the right of the decimal shall be dropped and the average elapsed duration time shall be scored to the nearest mathematical tenth.

Gas Lines and Air Ways

(Continued from page 42)

Class C: Russell Scott, Laurel Springs; H. Kuhn, Washington, D.C.; Sal Taibi, Brooklyn, N.Y. Class B: Robert Griscom, Camden; Frank Autosh, Scranton, Pa.; Frank Nelson; Robert Modersohn, Maplewood, N.J.; J. Greenland, Yonkers, N.Y. Class A: Leon Shulman, Newark; Leonard Purdy, Cradelock, Va.; Wm. Smith, Springfield; Caldwell Johnson, Hampton; John Shellenberger, East Orange, N.J. Stunt: Harry Mayer, Westmont, N.J.; R. Laird, Springfield; H. Simmons, Middlesex. Beauty: Arthur Gray, Bound Brook, N.J.; John Powell, Jersey City; Elmer Powell, Jersey City. Program Prize: K. Birdsall, Hammonton, N.J.; C. Bernhard, Mt. Ranier, Md.; J. T. Noonan, Rumson, N.J.; F. McDougal, Jackson Heights, N.Y.

Massachusetts

Marjorie Day, secretary of the Witch City Gas Model Club of Salem, writes:

"We held our second meeting on March 9th, in Malden, at which a letter from our member in California, Mr. Rich, was read, telling of various meets he had attended.

"Due to inclement weather, club contests have had to be postponed; we are not 'fair weather' fliers but it just seems as if the weather is perfect until Sunday comes round. Many of us have flown and cracked our ships, so we have decided to wait.

"Our third meeting was held in Somerville on April 20th, in conjunction with a contest. However only two members were able to get the ships up for an official flight —a wind storm came up. Bruce Paton of Danvers made flights of 1:41-3/5 and 1:48 min. and Leonard Day of Danvers made a time of 1:08 minutes.

"All members are working hard to build good ships and get good times in order to win many of the outside contests we plan attending this summer. So beware, modelers!"

From Bob Orth of Pomona, California, contest chairman for Jack Ford Jr. Chapter No. 9 Disabled American Veterans of the World War, we receive a report of a recent meet:

"The third annual Pomona Gas Model Airplane contest, held at Los Angeles County fairground, furnished thrills for a crowd of 2000 who watched the little planes in their height and distance flights. The contest resulting in first prize of $50 going to Ray Acord of Hollywood, whose plane stayed aloft 16:51 minutes.

"Bill Rowe, San Bernardino, won the second prize of $25. His plane flew 16:6.2 minutes. Third prize, $15, went to William McCryndle, Pomona; his plane having flown 12:32.9 minutes. Bernie Simpson, Hollywood, was fourth with a time of 6:49 and Phillip Raber, Los Angeles, was fifth with time of 5:39.7. Simpson chose the $85 scholarship offered by Warren Aeronautical School as his prize, leaving the remaining $10 cash prize which went to Raber.

"Mrs. John Bunting, Pasadena, won first in the women's division, with a flight of better than two minutes. Billy Crowell, Pasadena, won first place in the junior division with a time of 3:6.0. Crowell is 11 years old, and was the youngest contestant.

"In all there were 269 entries; 90 prizes were given. Besides the cash and scholarship awards there were many merchandise and trophy awards. The Los Angeles Gas Model Airplane Club won the club trophy given by Fletcher Aircraft School. Local merchants as well as manufacturers and dealers in gas model aircraft were among prize donors. A number of the planes were sponsored by local merchants. The McCryndle plane was sponsored by Alpha Beta.

"Planes were brought here from thruout the Southland as far north as Bakersfield. One entrant was from Mesa, Ariz.

"The meet was under auspices of Jack Ford, Jr., chapter No. 9, Disabled American Veterans of the World War, which had cooperation of many different organizations and individuals. Services of 145 people were enlisted in staging the show. These services were donated, and all functioned efficiently.

"H.D. (Pop) Mosedale, of the Southern California Gas Model Airplane association, was field director; assisting him was Homer Smith, San Pedro. Joe Marriott and his Avions of Los Angeles were in charge of timing. F. Frederickson, of the Southern California association, and Dean Myers, East Bakersfield, were announcers.

"From Harold Strawn of 1018 E. 7th St., National City we hear that the Model-Airs club holds rubber meets on the first Sunday of each month. There is usually a large

entry list, making these gala affairs. The Model-Airs is the oldest rubber model club in San Diego and had its inception from contests sponsored by Mr. and Mrs. Harold Strawn, who have remained active with the club; Mrs. Strawn as treasurer and Mr. Strawn as contest director. Meets are open to all fliers, ranging in age from 10 to 50; special awards are given juniors under 16 years.

Indiana

Rodney Stread of Box 898, Cary Hall, West Lafayette tells us the Purdue Aeromodelers of Purdue University held an indoor contest on March 23rd in the Purdue Fieldhouse, which has a working ceiling of about 65 ft. Mr. Stread's report continues:

"A considerable number of entrants came from two Chicago clubs, the Aeronuts and the Illinois Model Aeroplane Club. Curtis Janke and Walter Erbach traveled 300 miles from Sheboygan, Wisconsin even though no prizes were offered. That is showing a real interest in model flying! Carl Goldberg flew his new ornithopter two and one-half minutes consistently. Milton Huguelet was making exceptionally good flights with his class A indoor glider.

"Several flights made at the meet have been sent to the Academy of Model Aeronautics for consideration as National records. Should any of these be accepted I will send a list of them in to you.

"The results of the meet were as follows:

Indoor Cabin Event

Walter Erbach, Sheboygan, Wisc.....10:35.2
Joe Matulis, Chicago.....10: 6.6
Jim Cahill, Connersville, Indiana..... 8:36.2
Francis Heeb, Connersville, Indiana.. 3:18.9

Indoor Stick Event

Curtis Janke, Sheboygan, Wisc.....13:55.5
Otto Curth, Chicago 12:45.4
Francis Heeb, Connersville, Indiana..12:21.7
Walter March, Chicago.....12:10.8
Joe Matulis, Chicago 11:18.2
Bob DeBatty, Chicago.....11: 9.2
Jim Cahill, Connersville, Indiana.....10:46.5

"Walter March and Jim Cahill flew the same ships they used at the National Meet and the Mississippi Valley meet; these two are old rivals."

New York

The Capitol District Aeronautic Association of Albany is holding a series of contests (Listed in "Coming Events"). This group is not, as yet, very well known; Mr. John H. Schneider sends us the following history of its origin and activities:

"Two years ago representatives of the model groups of Albany, Amsterdam, Gloversville and Schenectady met and formed the C.D.A.A. with the express purpose of providing model activity in our area. We held two contests outdoors in 1939. Last year, 1940, we sponsored one indoor contest, three outdoor contests and one outdoor record trials. There were about 75 active modelers in the group. Last year thirteen national records were broken or established under the new rules by members of the association.

"Mr. Albert Hurd, Albany and Mr. J. Paul Lusk, Schenectady, our A.M.A. contest directors, are very competent and contests are run very efficiently, in accordance with A.M.A. rules and regulations. It is the policy of the C.D.A.A. to conduct meets to the best interest of the modeler. Therefore we provide good facilities for processing and take-off, sufficient officials so there is no waiting to fly and substantial awards for the winners. We do not have a sponsor. Our contests are financed entirely by entry fees, money raised by the various clubs and some donations. In spite of this our entry fees are not high.

"This year we are holding four outdoor record trials (no prizes except the opportunity to set a national record), one at each of the club's local flying fields. This will help each club to advertise and boost model activity in its home town.

"Our R.O.W. record trials to be held on Sacandaga Reservoir in cooperation with the Mayfield Yacht Club is in the nature of an experiment. The reservoir is approximately twenty-five miles long and three miles wide and unless the weather is too rough we expect to operate from an island which will give us plenty of room in all directions. Prizes will be awarded for both gas and rubber events. The yacht club is supplying us with boats and docking facilities.

"We are holding two combination rubber and gas model contests and one glider and sailplane meet at the Albany Airport, at which attractive trophy and merchandise prizes will be given."

Mr. Kenneth Kapus of 91-26 213 Street, Queens Village, N.Y., secretary-treasurer of the Queens Aero Club, tells us the club has been doing night flying for a period of a year, and has lost only one ship during this time—and that was found the next day. Ships are rigged with a good practical lighting system, usually in the bottom of the fuselage. Two pencells give a bright light which can be seen for quite a distance. Mr. Kapus continues:

"A 10-second motor run is customary, used with a good turn in the ship. You cannot see the ship, you see only the light; you think the plane is about a block away and it lands almost in front of you. Any one can fly at night if he uses this method."

This type of flying might be interesting for other clubs to try.

South Carolina

We hear from Simpsonville, as Charles Folk writes:

"As secretary of the Simpsonville Thermal Chasers, I would like to let you know something of this recently organized gas model club.

"Gas modeling is in its infancy here, start-

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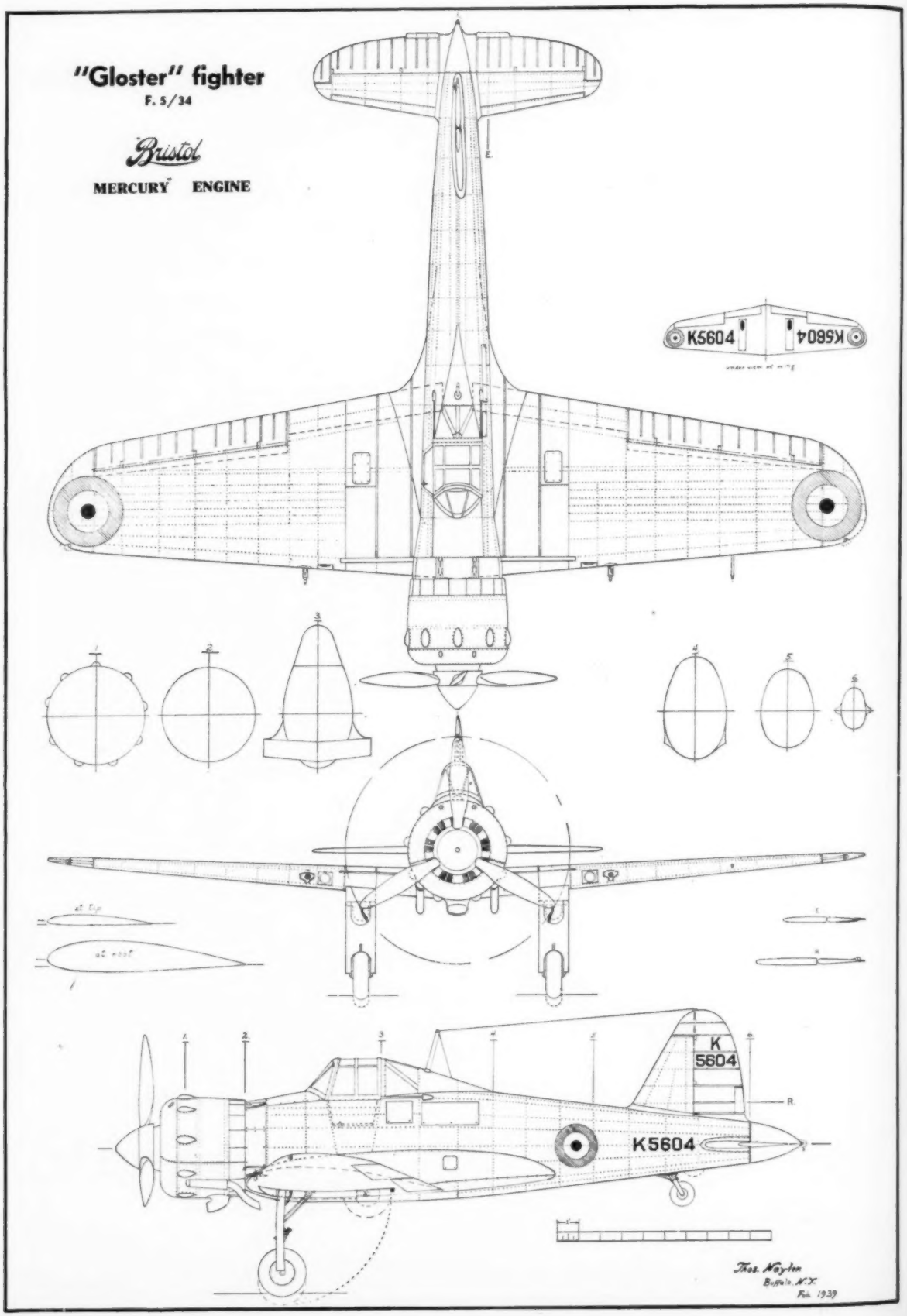
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ed about a year ago when I built the first gas job. We now have seven gas modelers, have built over thirteen jobs and have organized the Thermal Chasers. This may seem to be a small club but since there are only 2,500 people in this town we are proud of this number. Many towns of 60,000 and over have gas model clubs with only a few members such as twelve or thirteen. It looks as if these clubs could create interest enough to grow in places of this size. We have influenced boys in other towns and started them on their way toward gas model building. When the flying season starts we hope to find a few more boys here to start building models and help them get a good start.

"Last Tuesday we had our first real snow in quite a few years. Not willing to lose any flying time we equipped one of our planes with skiis and using a smooth running, easy starting engine we tried snow flying for the first time. The first flight was not successful as the boy launching it did not push or shove it, depending on the motor to get it off. It traveled about one hundred yards without lifting before jumping a ditch into a brush pile. Better luck prevailed on the next flight and the ship got off to a slow but steady climb after a run of only three yards. One more flight was completed, then the motor refused to run, as motors have a habit of doing in this cold weather and when a crowd gathers to watch the fireworks. The only noticeable difference in flight with skiis was in the climb, the weight of the heavy skiis cutting the rate of climb considerably.

"Not only has the club caused interest in town but at school also; an Aviation Club was organized in November and holds meetings once a week.

"Northdale Model Airplane Flying Field is now known to a great many flyers.

"It is the purpose of our organization to maintain and promote interest in gas model aircraft and to accomplish this purpose we do not limit membership to owners of gas models. Any one who is interested in this fascinating hobby is eligible for membership in our club.

"Our contemplated program includes the lease and maintenance of our own flying field, N.A.A. affiliation and inter-club and intra-club contests. At the present time we are negotiating with one of the largest fraternal and social organizations in this city to act in the capacity of sponsors."

Ohio

Lyle Crist of 611 South Union Ave., Alliance, writes:

"Here in Alliance a group of approximately twenty-two boys have organized a model airplane club known as the Flying Screwballs. This club has established headquarters in the Carnegie Library, South Arch Avenue.

"The club has adopted a set of by-laws and a constitution. These by-laws call for meetings to be held on the first and third Mondays of each month and an entrance fee of 50c with monthly dues of 25c.

"While the club is new, many boys in town have already shown an increased interest in model building. The club plans to purchase the club insignia in decal form for use of its members. We boast of many excellent modelers in all fields of activity; already we have one radio job and expect to have another soon. Our activities will include contests throughout the spring, summer and autumn months."

Coming Events

August 10—Queens Village, N.Y.—Contest sponsored by Queens Aero Club. Full data obtainable from Kenneth J. Kapus, 91-26 213 Street, Queens Village.

Albany, N.Y.

June 15—N.Y. State Exchange Invitation Meet originally scheduled for June 8th transferred to June 15th at Albany Airport. Entry blanks from Harry C. Copeland, 712 Loew Bldg., Syracuse, N.Y.

June 29—Newport, R.I.—Originally noted as rubber powered contest. This is incorrect: Gas powered models only to be entered. Write Ellen D. Lynch, 12 Blackwell Pl., Newport for details.

June 15—Port Huron, Mich.—Inter City Model Club second annual state-wide meet for Classes A, B, C gas; stick and fuselage rubber contests. Rain date following Sunday. Prizes to be awarded; contest has A.M.A. sanction. Write Edwin Bryan, 1708 Eighth Street, Port Huron, for entry blank.

June 22—Ypsilanti, Mich.—Second annual Hornet Model Club meet at McEnnan Airport, 3 miles south of Ypsilanti, via South Huron St. Ypsilanti Jr. Chamber of Commerce sponsoring event and guarantees over $100 in merchandise awards. Events are: Combined Class C-D-E outdoor rubber fuselage, Classes A, B, C gas and special awards for beauty and novelty jobs. Flying from 10 A.M. to 4 P.M. AMA and Michigan Model Aircraft Council sanction. For details write Don Gridley, 192 Oak St., Ypsilanti.

August 3—Noblesville, Ind.—Second annual contest sponsored by Model Maniacs. $125 worth of prizes. Events: Classes A, B, C gas; Open class rubber. A.M.A. rules. Entry fee: 50c in advance, $1 day of contest, 25c for rubber. Send entries to Model Maniacs, Noblesville.

June 22—Des Moines, Iowa—Des Moines Register and Tribune State Model Airplane Meet at the Fort Des Moines Army Post. Open to Iowans only; gas and rubber powered models. Obtain entry blanks from W. B. Wright, "Des Moines Register and Tribune."

June 14 and 15—Daytona Beach, Fla.—Florida State Model Airplane Meet, sponsored by Daytona Beach Exchange Club. AMA sanction. Gliders and Rubber events the 14th; gas, the 15th. Over $300 in prizes, including Grand Prize of a trip to the Nationals for Meet Winner. Entry blanks obtainable from William T. Thomas of 105 N. Halifax Ave., Daytona Beach.

September 7—New Haven, Conn.—North Eastern States Gas Model Championships at New Haven Municipal Airport. Sponsored by Elm City Gas Bugs of New Haven. For details write Miss Helen Paulson, 529 Quinnipiac Avenue, New Haven.

June 15—Fairmont, Minn.—Third annual Southern Minnesota Model Airplane Meet. All classes for gas and rubber models, also novice events. $250 in prizes. Sponsored by Fairmont Jr. Chamber of Commerce, to whom you should write for further details.

September 7—Jamaica, N.Y.—Second annual gas model contest sponsored by Prop Spinners Gas Model Club of Jamaica. Write Steve Kasprzak, 105-10 Remington St., Jamaica, for further details.

July 13—Meadville, Pa.—First annual Keystone Fliers Gas Model Contest. Meet will be a tri-state contest, AMA sanctioned. Many prizes. For entry blank write Keystone Fliers c/o Ted Byham's Sport Store, 271 Arch St., Meadville.

All following events are scheduled meets to be held by the Capitol District Aeronautic Association, Albany, N.Y. AMA sanctioned and open to all licensed fliers.

June 22—Outdoor record trials, Perth, N.Y. Director, J. P. Lusk, 204 Clinton St., Schenectady.

July 20—Contest, Gas and Rubber, Albany, N.Y. Director, J. P. Lusk, 204 Clinton St., Schenectady.

July 27—R.O.W. record trials, Mayfield, N.Y. Director, J. P. Lusk, 204 Clinton St., Schenectady.

Aug. 4—Outdoor record trials, Gloversville, N.Y. Director, J. P. Luck, 204 Clinton St., Schenectady.

Aug. 17—Contest, H.L. and T.L. glider, Albany, N.Y. Director, J. P. Lusk, 204 Clinton St., Schenectady.

Sept. 7—Contest, Gas and Rubber, Albany, N.Y. Director, Albert Hurd, 17 Steuben St., Albany.

Sept. 21—Outdoor record trials, Schenectady, N.Y. Director, Albert Hurd, 17 Steuben St., Albany.

Notices

We have received a very urgent request for issues of MODEL AIRPLANE NEWS prior to December, 1936. If any readers are willing to sell (or possibly loan) their issues to Walter Nunn, Warren Easton High School, New Orleans, La., would they please contact him?

Another request for copies, since June 1940, comes from H. C. Flello of 83 Old Road West, Gravesend, Kent, England. Mr. Flello says he'll willingly exchange copies of the "Aero-Modeller" for copies of M.A.N. Also, he'd greatly appreciate it if modelers would correspond with him.

Oscar Eklof of Box 13, Torshalla, Sweden writes: "Is there some boy or girl among MODEL AIRPLANE NEWS readers who would wish to write letters to a Swedish boy? I am 22 years old and have seen service in the Swedish Royal Air Force."

Question: Which two wing sections would be the best for gliding and flying ability, gliding especially?

Answer: The Clark Y has a higher L/D than the Eiffel 400, and therefore would give a smaller angle of glide; that is, it will glide flatter. The Clark Y will give a greater rate of climb, not necessarily angle of climb. The only disadvantage of the Clark Y is that it is faster than the Eiffel 400 and will induce more parasitic drag in your airplane, which may detract from its efficiency.

On an endurance model it is always wise to select an airfoil which will give a slow flight as well as an efficient glide and a high climb. The Eiffel will give a slow flight and a slow sinking speed but has not the efficiency of the Clark Y. A section which will give all the qualities desired is the Grant X-8 airfoil section, which is shown on page 30 of the September issue of MODEL AIRPLANE NEWS. Neither the Clark Y nor the Eiffel 400 give all the qualities desired, each one gives *some* only. The qualities which may be attributed to the X-8 are: a good glide, slow sinking speed and a good climb.

Question: Is a six to one aspect ratio for the wing all right? If not, what would be the best?

Answer: For endurance and soaring qualities the six to one aspect ratio is entirely too small. The higher the aspect ratio is up to ten or twelve the greater soaring qualities your model will have and the smaller the center of pressure movement will be. This means that the higher the aspect ratio for any given area, the more stable is the model. We suggest an aspect ratio of eight.

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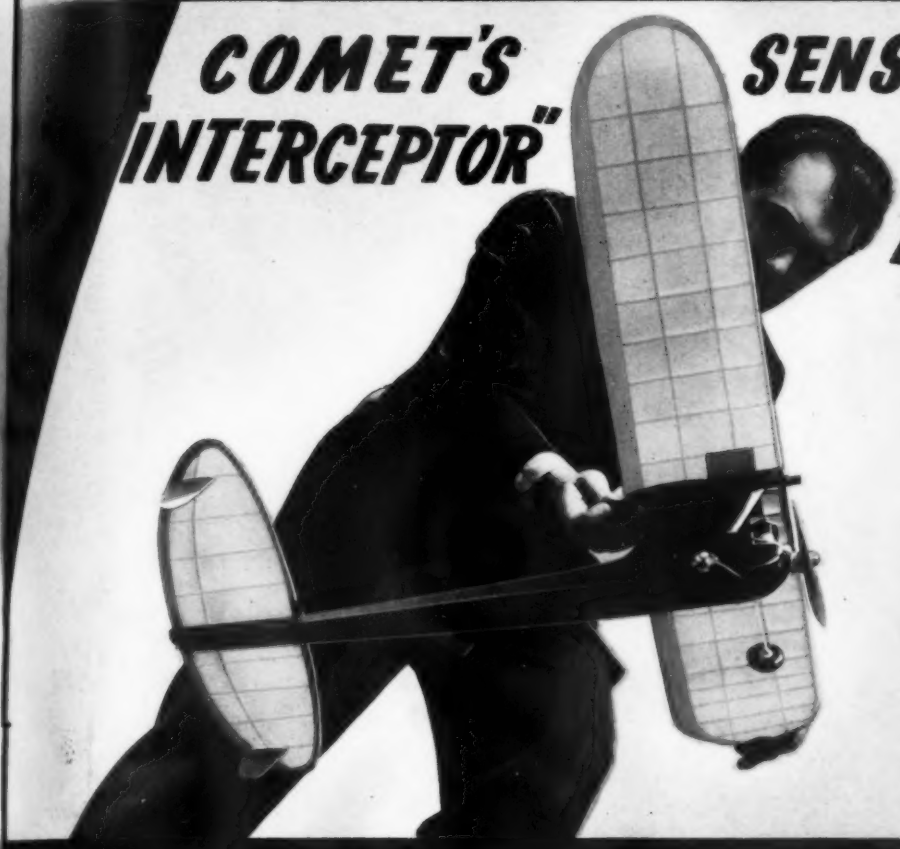

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Area	2 sq. ft.	Arec	2.3 sq. ft.
Wing loading	8 oz./sq. ft.	Wing loading	8 oz./sq. ft.

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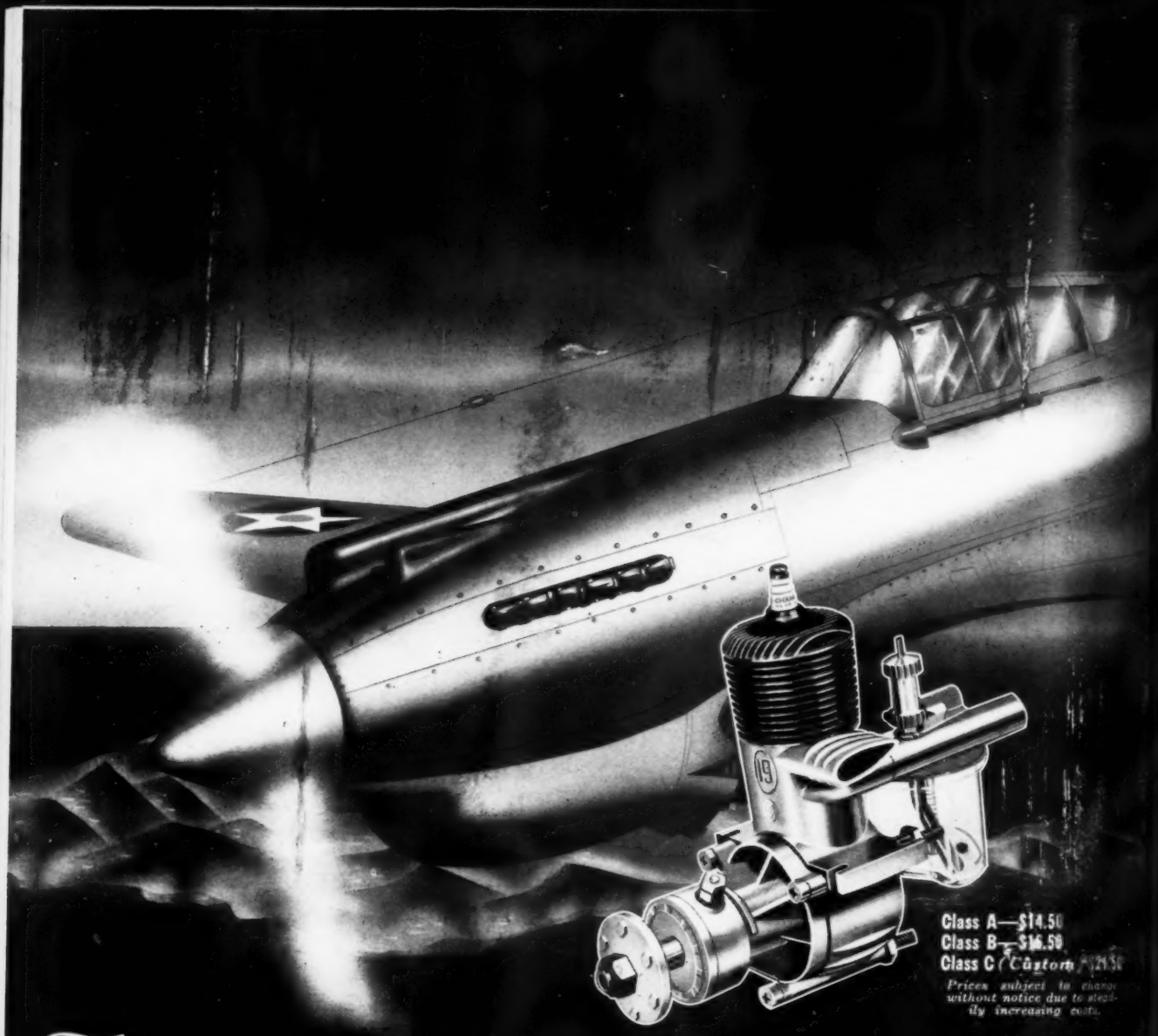
• See Opposite Page for Listing of Comet Distributors •



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